

The AUTOMOBILE

Twenty-two Cars Qualify for 500-Mile Race

Wilcox in New Stutz Qualifies at 98.9 M.P.H.—Mercers and Porter-Knights Withdrawn—Cornelian, Smallest Car in Race, Qualifies First Day—Many New Drivers

By David Beecroft

INDIANAPOLIS, IND., Motor Speedway Official Stand—May 24—*Special Telegram*—Speed qualifying trials for the fifth annual 500-mile Speedway race were completed today at 5:30 and the twenty-two cars to start in Saturday's race were definitely known. The trials to select which of the forty cars entered would qualify were scheduled for Thursday, Friday and Saturday of last week, but owing to inclement weather and lack of preparedness on the part of several entrants, the qualifying time was extended for 2 days.

Instead of thirty starters, as a year ago, probably only twenty-two will start, many of the forty entered being eliminated by mechanical troubles and others failing to make the required speed of 80 miles per hour for one lap of the 2 1-2 mile Speedway.

During today many eliminations took place. The team of three new Mercer racers withdrew as two of them broke connecting-rods

Cars Which Qualified

Car	Driver	Time	M.P.H.
Stutz	Wilcox	1:31.0	98.9
Mercedes	R. De Palma.....	1:31.3	98.6
Peugeot	Resta	1:31.4	98.5
Stutz	Cooper	1:33.0	96.75
Stutz	Anderson	1:33.4	96.4
Sunbeam	Porporato	1:34.0	95.1
Sunbeam	Oldfield	1:36.0	93.75
Peugeot	Burman	1:37.4	92.4
Kleinart	Klein	1:39.8	90.2
Peugeot	Lecain	1:40.6	89.5
Duesenberg	Alley	1:40.0	90.
Sunbeam	Grant	1:40.8	89.25
Duesenberg	O'Donnell	1:41.2	89.0
Peugeot	Babcock	1:41.4	88.9
Sebring	Cooper	1:45.4	85.5
Maxwell	Carlson	1:47.0	84.1
Maxwell	Orr	1:47.8	83.5
Duesenberg	Mulford	1:48.8	82.7
Maxwell	Rickenbacher	1:49.8	82.0
Mais	Mais	1:49.8	82.0
Cino-Purcell	Cox	1:50.4	81.5
Cornelian	Boyer	1:51.0	81.1

and tore holes in the cylinder castings and crankcases. The cars were new, some of them having done scarcely 100 miles before reaching the Speedway. The company was not able to get the desired steel for the rods.

There was also keen disappointment when none of the team of three Porter-Knight sleeve-valve cars qualified, due to piston rings breaking. The cars were late in reaching the Speedway and did not have time to work the new motors in. New piston rings were made, but failed to reach here in time.

This year's field of starters gives promise of cutting last year's record of 82.47 miles per hour. While Boillot's Peugeot's qualifying record of a lap at 99.85 miles per hour was not bettered or even equalled, there is this year a group of five or six cars faster than the same number of leaders a year ago. First honors go to Howard Wilcox in one of the new sixteen-valve Stutz cars who made the lap in 1.31, a speed of

98.9 miles per hour, the second fastest circuit ever made on the Speedway. This mark, made Sunday afternoon before an attendance of 7,500, was the most popular event of the 5 days given over to qualifying work.

Mercedes Second

Close behind the Stutz came Ralph De Palma in the Grand Prize Mercedes that won in France a year ago and captured the two Elgin road races last fall. De Palma's time was 1:31.2, only 3-10 of a second slower than Wilcox, and at a speed of 98.6 miles per hour. De Palma made his lap on Saturday. He did not make an additional trial at the Stutz record. Each car in qualifying had three trials if needed. De Palma took two, in 1:31.7 and 1:31.3.

De Palma had but a narrow margin on second place as Resta sent his Peugeot around in 1:31.4, just 1-10 of a second slower than De Palma. Resta drove the track well, but shut off on all four turns, whereas De Palma did not shut off on any of them. Resta's car was designed to carry two extra tires on the rear for road racing and on the Speedway without these the rear is a little light and skids on the turns.

Fourth and fifth places were taken by the other two Stutz cars driven by Earl Cooper and Gil Anderson. Cooper made his best lap in 1:33, a speed of 96.75 miles per hour, and Anderson's time of 1:33.4 was at a pace of 96.4 miles per hour. The work of these Stutz cars qualifying in the first five cars, is one of the best qualifying performances, and stands as a record. The Stutz company set out in a businesslike way to build new designs to meet the 300 cubic inch requirements and have made good. The cars were completed early and have been well worn in.

Sunbeam Sixth

Porporato, a new foreign driver, put his Sunbeam into sixth place in 1:34.6, a pace of 95.1 miles per hour. Burman landed his Peugeot in seventh in 1:37.4 or 92.4 miles per hour. Eighth place was taken by Klein in Kleinart at 1:39.8 or 90.2 miles per hour. Ninth place was taken by Tom Alley in a Duesenberg in 1.40 flat, a pace of 90 miles per hour. The Duesenberg team was late in reaching the track, but was whipped into shape in remarkably quick time. These were the only cars to qualify at a speed of 90 miles per hour or higher. Last year eight cars qualified at 90 or better as compared with nine this year. Last year the motors were 450 cubic inches or under and this year they are 300 inches or under. The small motors have shown up better than was expected.

Oldfield qualified the Bugatti in

First Ten Cars in 1914

Car	Driver	M.P.H.
Delage	Thomas	82.47
Peugeot	Duray	80.99
Delage	Guyot	80.20
Peugeot	Goux	79.49
Stutz	Oldfield	78.14
Excelsior	Christiaens	77.44
Sunbeam	Grant	75.68
Beaver Bullet	Keene	74.82
Maxwell	Carlson	70.97
Duesenberg	Rickenbacher	70.83

First Ten Cars in 1913

Car	Driver	M.P.H.
Peugeot	Goux	75.94
Mercer	Wishart	73.49
Stutz	Merz	73.39
Sunbeam	Guyot	70.92
Mercedes	Pilette	68.14
Grey Fox	Wilcox	67.65
Mercedes	Mulford	66.95
Case	Disbrow	66.79
Mason	Haupt	63.47
Tulsa	Clark	62.99

First Ten Cars in 1912

Car	Driver	M.P.H.
National	Dawson	78.7
Fiat	Tetzlaff	76.6
Mercer	Hughes	76.3
Stutz	Merz	76.0
Schacht	Endicott	73.3
Stutz	Zengel	73.0
White	Jenkins	72.7
Lozier	Hearne	71.4
National	Wilcox	69.6
Knox	Mulford	56.2

First Ten Cars in 1911

Car	Driver	M.P.H.
Marmon	Harroun	74.8
Lozier	Mulford	74.28
Fiat	Brown	72.7
Mercedes	Wishart	72.6
Marmon	Dawson	72.3
Simplex	De Palma	71.0
National	Merz	70.3
Amplex	Turner	68.9
Knox	Belcher	68.3
Jackson	Cobe	67.9

1:50.4, a speed of 81.5 miles per hour, but later when warming up for a record trial, burned out a connecting-rod which destroyed the side of the crankcase and the car was withdrawn.

Emden Withdrawn

The Emden entry from Iowa made a lap in 1:42, or 80.3 miles per hour, but the driver, due to lack of racing experience, was not permitted to drive and the entry was withdrawn.

It was hoped that the Delage entry driven by John De Palma, a brother of Ralph, would qualify which it did in 1:43.4 or 87.25 miles per hour on his first trial. When taking his second trial on Sunday afternoon he skidded entering the homestretch and struck the inside wall, breaking the front end of the frame but not seriously injuring the driver or mechanic; the car skidded on the curve and after turning around twice, rolled three times, without damaging the motor, gearset or transmission parts.

The three Mercers did not have much opportunity for practice. Only one of them came out to qualify. It was driven by Ruckstell and made its lap in 1:47.4 or 84.6 miles per hour.

One of the best qualifying performances was that of the Cornelian with its tiny motor of 116 cubic inches and weighing less than 1,000 pounds. Driven by Boyer it made the 2 1-2 mile lap, in 1:51 or 81.1 miles per hour and was the first car to qualify, taking its trial on Thursday May 20, the only car to take the trials on the opening day.

Although three Bergdoll cars were entered only one reached the Speedway. It arrived before noon today and in its trials failed to qualify, making but 75.95 miles per hour. It was driven by Willie Haupt, who has had a long experience in racing but who was unable to get the motor to fire regularly, missing all the way around the circuit.

Four Peugeots were entered, one being named as a Burman special. As it was a Peugeot design, but with cylinder castings made in an American factory, it was ruled to be a Peugeot entry. This meant that three fastest only would be allowed to start. Two of these cars are larger than the other two, Resta and Burman driving them. It was a fight between Babcock and Lecain driving the smaller two, to see which would qualify. Babcock first qualified.

Lecain in his second trial, made the lap nearly a second better than Babcock and qualified in 1:40.6 or 89.5 miles per hour. This Peugeot is 183 cubic inches as compared with 274 cubic inches in the cars of Resta and Burman. In their second trials began the battle for positions in the front line of starters on race day, it being considered a big advantage to get in the front line.

The battle for positions in the second line of starters was also a spirited one. The Bergdoll's best time was 1:58.5 or considerably above 1:52.25 which is the lap time for an 80 mile average. Devore in one of the Porter-Knights made the lap in 1:53.7, or a little under the 80 mile an hour gait.

Many old faces in 500-mile races will be missing Saturday and not a single winner of any of the four previous races will be driving. Ray Harroun, the first winner, is managing the Maxwell team but is not doing any driving. Joe Dawson, second winner, will witness this year's race from the pits. Goux and Thomas, winners in 1913 and 1914, are in the war at present. There are other old faces missing this year including Caleb Bragg, Tetzlaff, Knipper, Charles Merz and many foreigners who have been such factors for the last 2 years.

There are new drivers on every hand, some from Europe and many from America. Resta, who recently won the Vanderbilt and Grand Prize, is a real contender. Porporato, handling a Sunbeam, has had a long driving experience abroad.

In the American field are Tom Alley and E. O'Donnell both driving Duesenbergs and who rode as mechanics last year. Other new names are Babcock in a Peugeot, Boyer in Cornelian, Cooper in Sebring, Mais in the Mais, and Cox in the Cino-Purcell.

Four countries are represented in this year's race, America, England, France and Germany, as compared with six in last year's race, Italy and Belgium not being represented this year. Germany has one Mercedes, France has three Peugeots and England has three Sunbeams, a total of seven.

America is represented by fifteen starters representing eight makes. Such American names as Marmon, National and Mercer, so long associated with 500-mile races, are absent. Stutz, Maxwell, and Duesenberg are the three teams representing American factories.

Oldfield Drives Sunbeam

After Barney Oldfield's Bugatti was out with a broken crankcase, Barney was heard to say, "Well, I will watch the race from the Grandstand." These plans were later on upset. Today he signed to drive a Sunbeam, the one to be driven by

Graham, an English driver. Graham had qualified the car at 1:43 and Barney in his first trial cut this to 1:36, and so greatly bettered his starting position.

Fast Time Promised

Saturday's start gives promise of being one of the fastest ever seen on the Speedway. In the front row will be four of the fastest cars in the land, two Stutz cars, a Mercedes, and a Peugeot, piloted by such experts as Wilcox, Cooper, De Palma, and Resta. Behind these will come a second line of equally stellar racers, Anderson in a Stutz, Porporato in a Sunbeam, Oldfield in a Sunbeam, and Burman in a Peugeot.

Today the American car record for the 500-miles is held by the National, made in 1912, when Dawson averaged 78.7 miles per hour. In 1913 the fastest American was Wishart in a Mercer who averaged 73.49. Last year Barney Oldfield put the American mark at 78.15 with a Stutz. A new American record is looked for this week.

A protest was lodged with the Contest Board this afternoon by the Peugeot Import Co. against a decision made by the referee requiring Burman's entry to start as a Peugeot.

Burman's car was originally a Peugeot, but as several parts have been replaced during the last year, the Peugeot people believe that under the rules it should be entered as a Burman Special rather than a Peugeot. The apparent reason for the appeal from the referee's decision is that by classing Burman's entry as a Peugeot, one of the four Peugeots entered was not allowed to start, the A. A. A. rules only allowing three cars of any one make to start.

Under this same ruling only the three fastest of the four Sunbeams entered will be allowed to start. The same also applies to the Harroun special, in reality a Maxwell, and which was only allowed to start as a Maxwell. This made four Maxwell entries.

The Duesenberg entries which were late to reach the Speedway made good in their early qualification. Alley set the qualifying pace for his team at 90 miles per hour. O'Donnell was next at 89 and Mulford who reached the Speedway this morning, put the third over at a speed of 82.7 miles per hour. Mulford had entered a car of his own make but it was not shipped from Brooklyn as it was not ready for the race.

Specifications of the 22 Cars That Qualified for the 500-Mile International Sweepstakes Race, To Be Run on the Indianapolis Speedway, Decoration Day

Car	Driver	Bore	Stroke	Cast	Piston Displacement	Valve Location and Number	Diam.	Lift	Gear Ratio	Tires and Sizes	Wheel-base	Car-bureter	Magneto
Maxwell	Rickenbacher	3.75	6.75	Block	298	Head 4	2 1/4	1/8	2.6 to 1	..... 33x5	...	Master	Bosch
Maxwell	Carlson	3.75	6.75	Block	298	Head 2	2 1/4	1/8	2.6 to 1	..... 33x5	...	Master	Bosch
Maxwell	Orr	3.75	6.75	Block	298	Head 2	2 1/4	1/8	2.6 to 1	..... 33x5	...	Master	Bosch
Mercedes	R. DePalma	3.69	6.3	Singly	270.9	Head 4	1 1/2	1/8	3.1 to 1	..... 33x5	112	Packard	Bosch
Sunbeam	Porporato	3.69	6.3	Block	270.9	Head 4	2	1/8	2.85 to 1	Goodrich 33x5	112	...	Bosch
Sunbeam	Oldfield	3.69	6.3	Block	270.9	Head 4	2	1/8	2.85 to 1	Goodrich 33x5	112	...	Bosch
Sunbeam	Grant	3.13	5.9	Threes	278	Side 2	2	1/8	2.75 to 1	Silvertown 34x4 1/2	110	Master	Bosch
Stutz	Anderson	3.7	6.5	Block	296	Head 4	...	...	...	Silvertown 33x5	104	Stromberg	Bosch
Stutz	Cooper	3.7	6.5	Block	296	Head 4	...	...	...	Silvertown 33x5	104	Stromberg	Bosch
Stutz	Wilcox	3.7	6.5	Block	296	Head 4	...	...	...	Silvertown 33x5	104	Zenith	...
Peugeot	Resta	3.69	6.3	Block	274	Head 4	...	...	2.6 to 1	Goodrich 34x4 1/2	...	Zenith	Bosch
Peugeot	Burman	3.1	6.2	Block	183	Head 4	2	1/8	2.5 to 1	..... 34x4 1/2	107	Master	...
Peugeot	Lecain	3.1	6.2	Block	183	Head 4	2	1/8	3 to 1	..... 33x4 1/2	...	Rayfield	Bosch
Duesenberg	Alley	3.98	6	Block	299	Side Head 2	2 1/4	1	2.6 to 1	Nassau 33x5	106	Master	...
Duesenberg	O'Donnell	3.98	6	Block	299	Side Head 2	2 1/4	1	2.6 to 1	Nassau 33x5	106	Master	Bosch
Duesenberg		3.98	6	Block	299	Side Head 2	2 1/4	1	2.6 to 1	Nassau 33x5	106	Schebler	Bosch
Sebring		3.98	6	Block	299	Side Head 2	2 1/4	1	2.6 to 1	..... 33x5	102	Schebler	Bosch
Purcell	Cox	4.37	4.97	Pairs	299	Side 2	2	1/8	2.3 to 1	Silvertown 34x4 1/2	113	.....	...
Cornelian	Chevrolet	2.06	4.25	Block	103	Side Head 4	...	...	2.5 to 1	Nassau 34x5	...	Claudel	...
Delage	J. De Palma	3.65	7.1	Block	299	.....	...	...	...	.....	...	.....	...
Kleinart	Klein	3.98	6	Block	299.5	.....	...	...	...	.....	...	.....	...
Mais	Mais	4.3	4.9	Pairs	284.4	Side Head 2	2 1/4	1	...	..... 33x4 1/2	108	Rayfield	Bosch

NOTE.—All cars are four-cylinders, except Grant's Sunbeam, which is a six.

Valve-in-Head Motor Supreme

Close Similarity Marks Many Cars Entered for 500-Mile Race—Multiple Valves Are Common—Ball-Bearing Motors on Many Cars—Gear Ratios Lower

By A. Ludlow Clayden

UNLESS one of the little known cars should show up in a most unexpected and unlikely way it is safe to predict that the first ten cars to finish the Indianapolis Speedway contest will have motors that are very much alike externally. There is not much variation in gear ratio among those which are expected to take a place in the prize list, so there is little to choose in the number of explosions per minute of each motor, which means that high explosion pressure and small windage ought to be the deciding factor.

It is not far from the truth to say that the coming race will be one of acceleration, a test of the power of the cars to get away from 80 miles an hour up to 100, for there will not be many that can do the whole circuit on open throttle. The least sluggishness in getting away as the straightaways are entered is liable to put a car out of the first bunch and this means that weight has a good deal to do with it. Still the main thing is to have as powerful an explosion as possible and it is to this end that we find the predominance of overhead valves, multiple valves and huge intake and exhaust pipes and manifolds.

Motors All One Family

Among the less known cars there are exceptions, but all the names which are household words to the speedway enthusiast denote cars with overhead valve motors and most of these are multiple valve types, too. That is they have three, or usually, four valves per cylinder. The purpose of this is to give the maximum of opening with the minimum lift of valve and weight thereof. For elimination of weight in the

valve system and to obtain the greatest possible rapidity of action the majority of the new cars have their camshafts overhead. Some have one and some have two, and there are all sorts of ways of driving the camshaft in use. Some have the valves set at an angle, Peugeot fashion, in a V-shaped combustion chamber; others have them flat, with the stems vertical in an enlarged cylinder head. Some operate the valves almost direct from the cams; others have rockers. But to a man with only a little mechanical knowledge the whole leading bunch are wonderfully similar.

Chassis Not Novel

These overhead valve motors are a new feature for racing in America, not because they have not been used before, but because never before has there been so many different cars using the same general scheme in conjunction with all the other kinks of high speed motor work which have been learned from other kinds of racing engines. In the chassis, however we find little that is abnormal and practically nothing that is new.

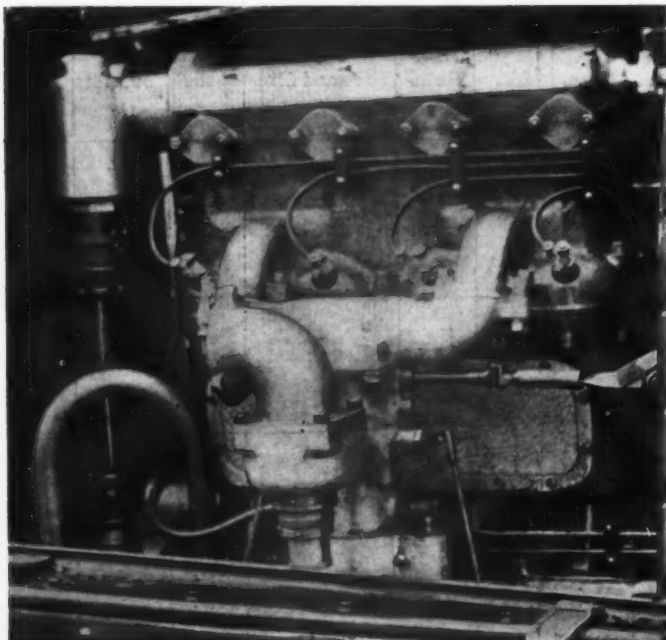
The Stutz team of three cars is in accordance with up-to-date racing science. There are four valves per cylinder operated by rockers from a single central camshaft which is driven by spur gearing at the front end. Ball bearings are used for the crankshaft, three in number, and the pistons are of a light aluminum alloy. Very considerable secrecy has been observed concerning this new Stutz racing machine, but there is a well accredited rumor to the effect that the motor is made by the Wisconsin company. In appearance the engine bears a strong resemblance to the Mercedes, having the same sort of camshaft case with a good deal of bronze work in it, and the aluminum casing for the train of spur gears at the front end looks very small as compared with Peugeot practice. Doubtless because there is only one camshaft to drive instead of two.

The bodies of these cars are very narrow and the radiators appear to be deeper than usual, so presumably the amount of water carried is greater than that used for most cars on the speedway. Needless to say, the cooling circulation is forced by a large water pump, since thermo-syphon systems are not up to the arduous work of a long race.

The Stutz chassis follows normal lines and is mainly conspicuous for absence of small rods and levers. Although it has no regular streamline tail the radiator, hood and cowl are shaped to offer the minimum of resistance, and a large dual tank for gasoline and oil offers flat sides and a rounded top to carry the draft away over the stern.

Thoroughly American Cars

It is noteworthy that this thoroughly American job is also using an entirely American carburetor in the Stromberg; in fact it is only the Bosch ignition that owes anything to foreign business interests and in this case the foreign nature is overcome by American manufacture. Probably the Stutzes rank high in the estimation of qualified judges of "form" and they are expected to give a very good account of themselves on the great day.



Carburetor side of the Maxwell motor, showing vertical shaft and camshaft drive for overhead valves

In some of the cars lightness is obtained mainly by the use of small sections of high tensile alloy steels, but in the Maxwells it was preferred to employ larger masses of light alloys. Of course they contain many fine steel portions but their main characteristic is the use of light metals.

Maxwell Has Upright Poppets

The Maxwell motor has overhead valves, of course, but they are not inclined, standing vertical with the stems upward. There are four per cylinder and they are operated by rockers from a single central camshaft, the valves being staggered so as to make room for enough cams.

A peculiarity of the motor for these days is that there is no external flywheel unless the clutch be counted as such, since the crankshaft is a counterbalanced structure in which cranks and flywheels are combined. This has been used before for Maxwell motors but hitherto the crankshaft was all one piece, whereas it is now divided in the middle to allow the mounting of a central ball bearing. The rear portion of this compound crankshaft has a splined end which slips into a corresponding female socket inside the center ball bearing. Each flywheel portion has counterweights to balance the crankpins and the rotating parts of the connecting rods.

For the pistons an aluminum alloy is employed the weight being thereby cut to 15 ounces as against about 2 pounds for cast iron of similar dimensions; the particular metal used being Magnalium. For other parts such as brake spiders and brackets the choice has been Macadamite, another alloy of great strength and low specific gravity.

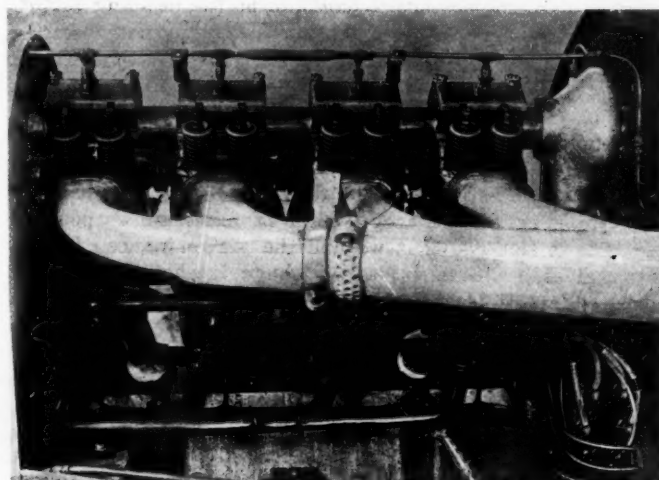
Lubrication is cared for by two independent systems, the simplest being a splash one purely. This is intended only for emergency and is under the control of the mechanic. The main system on which most reliance is placed consists of a low pressure force feed taken to each of the main ball bearings the overflow thence being caught inside sheet metal disks of flat cup form bolted against the balance weight or flywheel masses. Oil is thrown centrifugally to the limits allowed by these inverted saucers and conducted through holes in the crankpins to the connecting-rod bearings.

Maxwell is alone in using skew or helical gearing for driving the overhead camshaft instead of a spur gear train or bevel gearing.

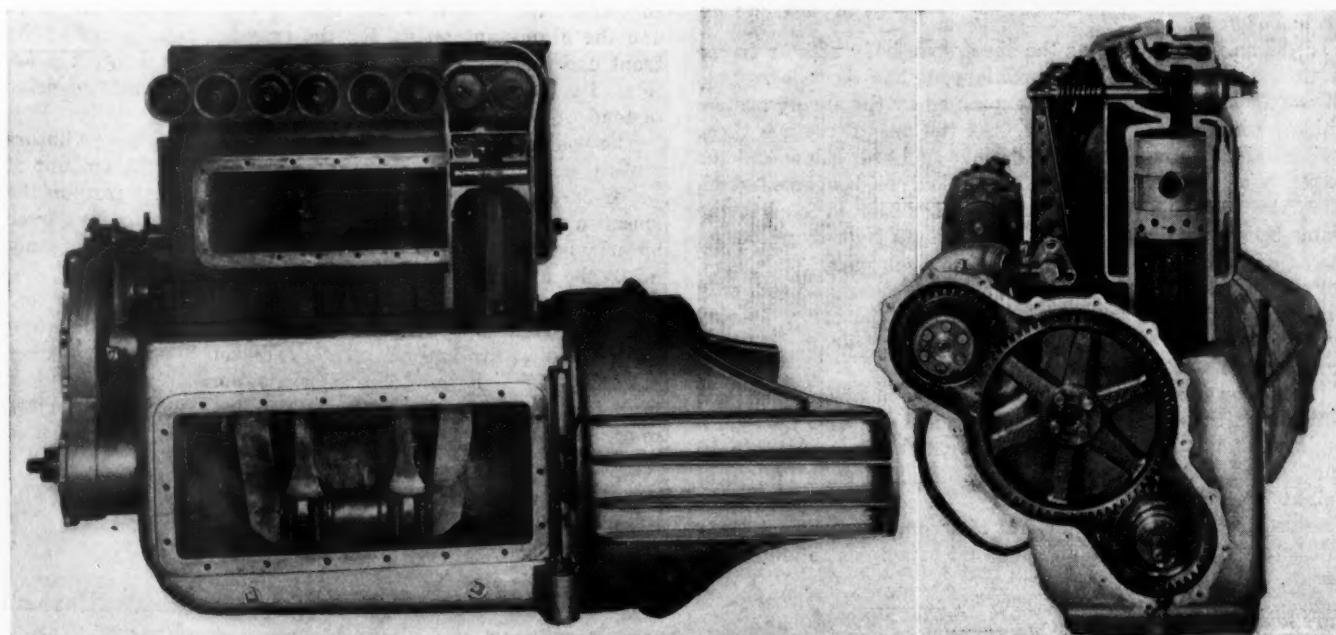
A well-known motor appears on almost half the other American entries excepting the small jobs, this being the



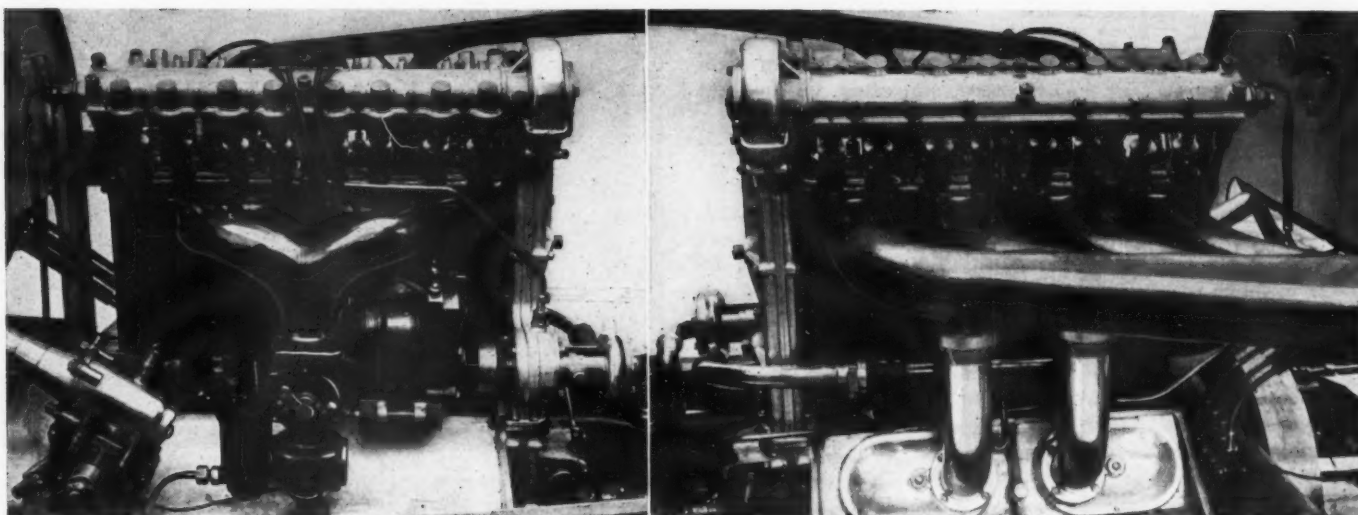
De Palma's Mercedes; intake side showing Packard carburetor. It is said that the adoption of this carburetor has clipped several seconds from the time required to make a lap of the 2.5-mile Indianapolis speedway, while there is no trouble in the way of popping and backfiring when shutting the car down on the turns besides increasing the power of the motor for long-distance work



Mercedes exhaust side; note vertical shaft at rear and one of two magnetos driven by a cross shaft



Side and end semi-sectional views of the Duesenberg motors, bringing out peculiarities of construction



Left and right view of Peugeot motors which are expected by many to show up well in this year's race

Duesenberg. This engine is the only example of specialized racing motor manufacture in the world and is fairly well known. The latest models were described in *THE AUTOMOBILE* dated February 11, page 272, so it is not necessary to do more than outline them here. The overhead valves, two per cylinder, are arranged horizontally and along one side of the cylinder block, while the camshaft is situated in the usual position in the crankcase. Instead of using long push rods and short rockers as has been done in the French Delage motor of similar idea, Duesenberg uses very long rockers with the upper ends bearing against the valves and the lower extremities against the cams. This makes a very neat looking motor and many cars using this engine have shown high speed capabilities.

The lubrication is duplex with a pump forcing in oil in excess of the requirements of the motor and a second pump to remove the surplus and return it to a tank where it can cool. Incidentally this is becoming a regular racing practice since the importance of a steady supply of cool oil was realized.

A particularly interesting small car because it is so small is the Cornelian. This has a Sterling motor of a paltry 116 cubic inch displacement and yet can lap at over 80 miles an hour owing to the negligible weight and windage of the tiny machine.

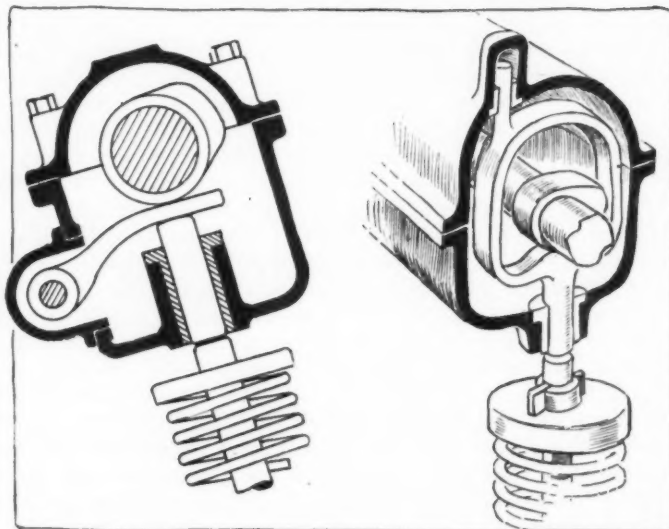
It has no frame at all as the sheet steel body acts as frame as well, and still more extraordinary, it has no axles. This sounds an impossibility, but is explained by the spring system which replaces the axle proper. At the rear there are three springs placed transversely one above and two below and the extremities of these springs are linked to brackets which carry the rear road wheels. The transmission is fixed to the frame-body and drives to the road wheels by two universal shafts after the fashion of the old De Dion cars.

For the front axle a similar construction is used only without the driving shafts, of course, and the car is steered by link rods and chains attached to a small drum which is keyed to the foot of the steering column.

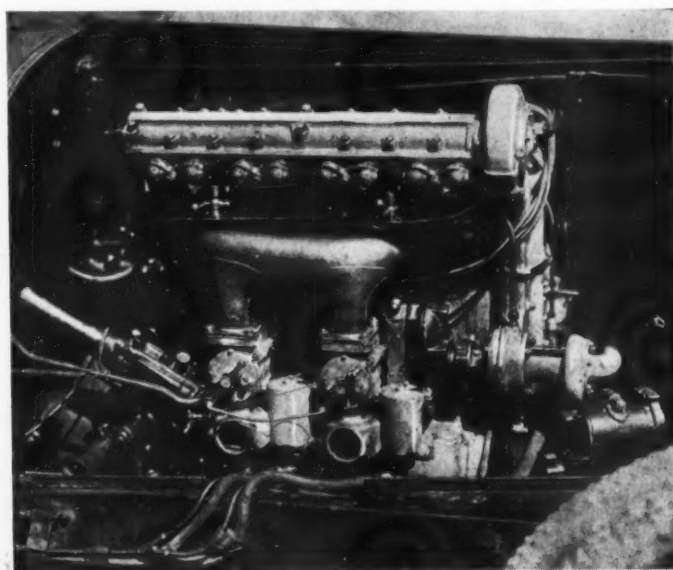
For motor the Sterling of standard type has been bored out a little and the valve gear has been tuned up; also there is a duplex exhaust branch, but the alterations are surprisingly small when the remarkable speed it considered. The total weight is given as 960 pounds only. Of course the car is not expected to come in a winner, but if it completes the course it will be a vindication of many original principles for light car design.

European Cars Important

Two cars stand out foremost among the European entry, Ralph De Palma's Mercedes and Resta's Peugeot. Both



Valve mechanism of Peugeot on the left, and Sunbeam on the right. Both are characteristic racing constructions. The Peugeot type, as may be seen in the illustration, is set at an angle, while the Sunbeam construction is vertically mounted



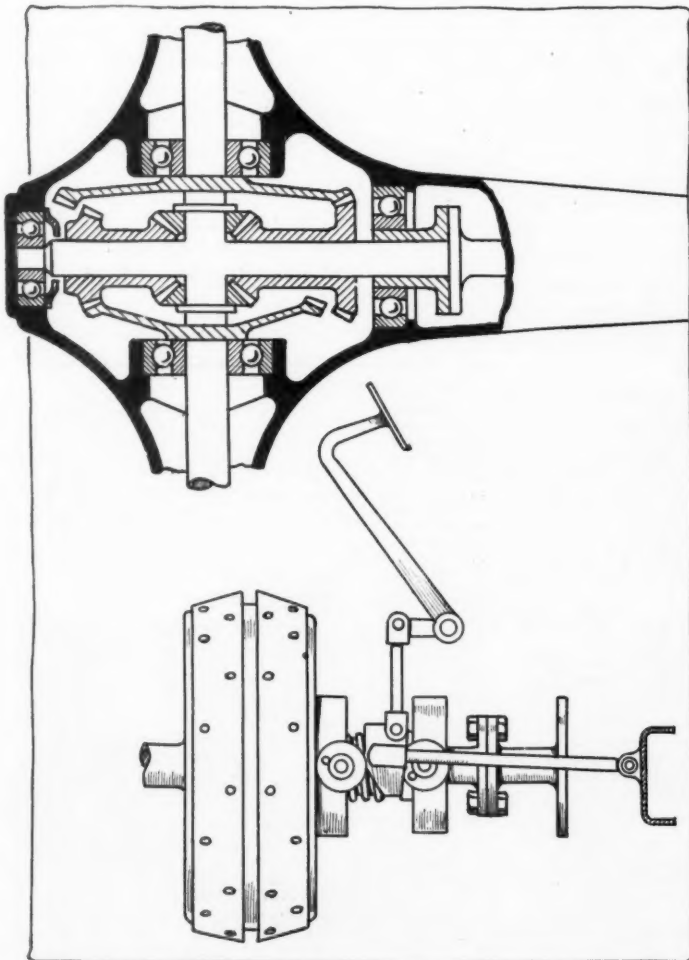
Side view of the Sunbeam motor which involves many unique features of design. Note two carburetors, an unusual construction with a four-cylinder motor

represent the best that Germany and France respectively have ever done to date, both are capable of huge speed and both are in the hands of first class men. The rest, the smaller Peugeots and the older cars, have not the mechanical interest of these leading two. We know the cars and look rather to see what the *men* can do with them.

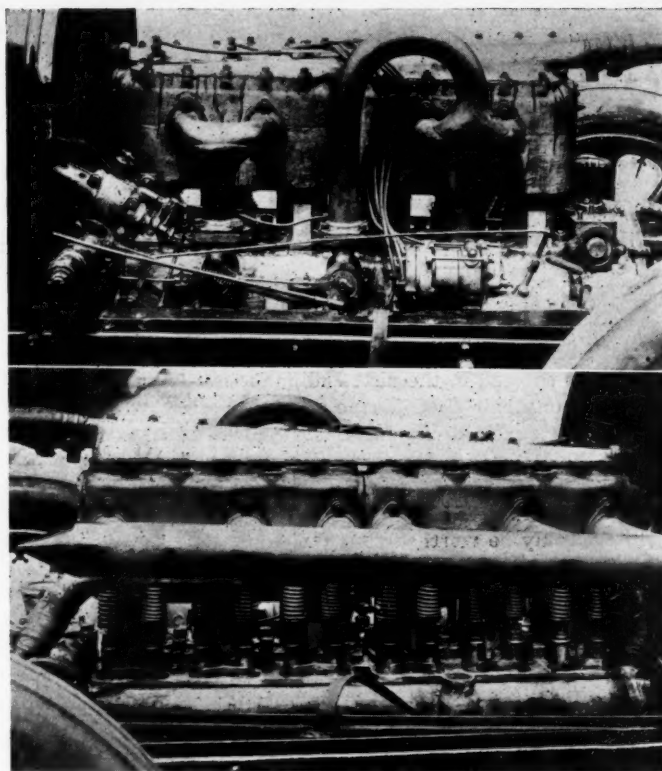
The Mercedes is the one which Wagner drove to second place in the French grand prix last year at Lyons. It has a most original motor in that the separate cylinders are steel forgings with the water jackets of sheet steel welded on. There are four valves overhead, operated by a single centrally located overhead camshaft, rockers being contained in a bronze camshaft casing. The drive for this shaft is by bevel gear and is located at the rear end of the motor, while the bearings are plain and not ball. It contains almost every possible feature of an overhead valve motor, which the Peugeot engineers discarded as not good.

Since this car was dealt with fully in THE AUTOMOBILE just after the French race last July, there is no need to repeat much about it as it has been changed in carbureter only, now having a Packard standard type in place of the original Mercedes. It is understood that this change has cut some two or three seconds off the possible lap time on the Speedway and onlookers can observe that there is no misfiring or popping when the throttle is shut off for the turns as is common with many racing carbureters. Despite the presence of an air valve, which is supposed generally to be bad for high speed work, the Packard carbureter certainly works wonderfully well.

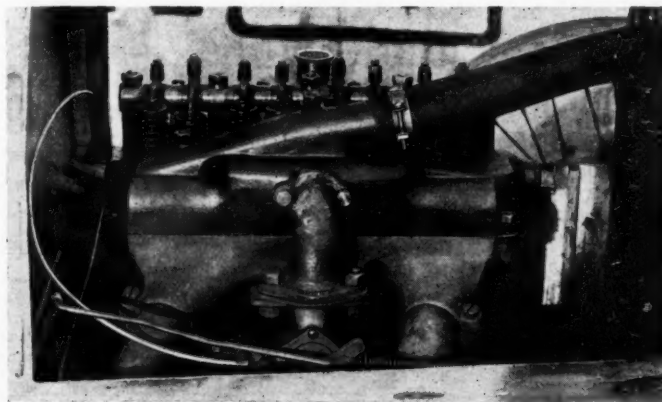
The car now has a new body with a square section tail, this having been built in Detroit to surround the gasoline tank behind the seats. A particularly striking feature is the



Mercedes features, above showing the rear axle construction with the duplex bevel gears, and below, the double cone clutch



Sunbeam six motor which will be driven by Grant



Intake side of Sterling motor used in the Cornelian, smallest car in the race

absolute steadiness of the front wheels when the car is traveling over 100 miles an hour on the straightaways, this being due to a castor wheel system worked out by Mercedes for the French classic.

Peugeot List Is Complete

First of all is Resta's car which was the spare car of the Peugeot team at Lyons last year. It is identical with the car that Boillot nearly drove to victory as he was only put out near the finish by a mischance which robbed him of second place. Practically it is as fast as the Mercedes. Cast iron cylinders with four valves per cylinder and two overhead camshafts driven by a train of spur gears at the front end, specify the motor, and the crankshaft bearings are ball. Lubrication is by drip feed through a row of sight feeds which lead to the bearings and sundry other parts, the circulation being maintained by pump and supplementary hand supply.

The bodywork has been altered a little; as in the French race a couple of spare wheels were carried standing length-

(Continued on page 931)

Speed Records of the 500-Mile Race

Thomas, in the Delage, Covered the Course at 82.47 M.P.H. Last Year—A High Mark for 1915 Winner to Surpass—Speed History

INDIANAPOLIS, IND., May 22—When the thirty-three cars entered in the next Indianapolis 500-mile race start out on their fast journey May 29, they will strive to wrest the laurels away from last year's winner, who negotiated the distance in the record time of 6 hours 3 minutes and 45 seconds, at an average speed of 82.47 miles an hour. René Thomas, in his Delage, indeed did create a record, one which will certainly be worth trying for, when it is considered that this is the second best time made on any track or road in this country for long distance races, the fastest time being made at Corona last Thanksgiving day, when Pullen averaged 87.8 miles per hour in a Mercer for the distance of 301 miles. Previous Indianapolis races, however, have all been fast, each of the winners having made over 74 miles an hour, while nineteen of the prize winners, including the leaders, have succeeded in beating the 70 miles per hour record and twenty-four of them have made the distance under 7 hours. And, to make it more interesting this year, the piston displacement will be smaller than in previous races, the maximum being 300 inches; last year's winning car had 380.2 inches.

Speed Higher Each Year

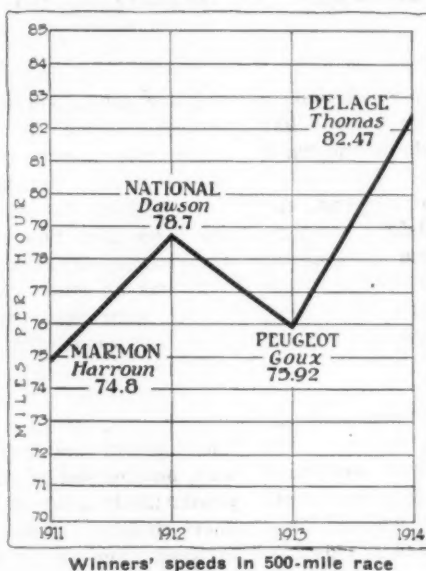
Going back to 1911 when the first 500-mile race was held, and tracing the time made by the different winners, there was but a slight difference each year; in 1911 Harroun, in a Mar-

mon six, made the distance in 6:42:08, a speed of 74.8 miles an hour; in 1912 Dawson, in a National, bettered the previous record by negotiating the distance in 6:21:06, an average of 78.7; in 1913 there was a perceptible drop in speed, but still better than the 1911 time, Goux's Peugeot making the 500 miles in 6:35:05, an average of 75.94 miles an hour. Last year's time was the best up to that date of any made on either road or track, the previous record having been made at Santa Monica in 1912, by Tetzlaff's Fiat, which averaged 78.71 miles an hour for 300 miles.

A note of interest is brought out by the fact that of the forty prize winners since 1911, there are ten money winners each year, only seven of these were equipped with six-cylinder motors and only one of these sixes succeeded in carrying off first place, and that was in the first race in 1911. The next best showing by the sixes was in 1913 when Guyot's Sunbeam came in fourth, averaging 70.92 miles an hour. Last year Christiaens' Excelsior and Grant's Sunbeam came in sixth and seventh, respectively. This year's list of qualified entries shows only one six, the Sunbeam driven by Harry Grant.

Seating Capacity 75,000

The seating capacity of the track has been increased to 75,000, construction of two new grandstands, seating 15,000 people, having been started last December. Additional improvements



ORDER OF SPEEDWAY TIME RECORDS

Car	Time	M.P.H.	When
Delage	6:03:45	82.47	First in 1914
Peugeot	6:10:24	80.99	Second in 1914
Delage	6:14:01	80.20	Third in 1914
Peugeot	6:17:24	79.49	Fourth in 1914
National	6:21:06	78.7	First in 1912
Stutz	6:23:51	78.14	Fifth in 1914
Excelsior	6:27:24	77.44	Sixth in 1914
Fiat	6:31:29	76.6	Second in 1912
Mercer	6:34:56	76.3	Third in 1912
Peugeot	6:35:05	75.94	First in 1913
Sunbeam	6:36:22	75.68	Seventh in 1914
Stutz	6:36:36	76	Fourth in 1912
Beaver Bullet	6:40:57	74.82	Eighth in 1914
Marmon	6:42:08	74.8	First in 1911
Lozier	6:43:51	74.28	Second in 1911
Schacht	6:46:28	73.3	Fifth in 1912
Mercer	6:48:13.4	73.49	Second in 1913
Stutz	6:48:49.25	73.39	Third in 1913
Stutz	6:50:28	73	Sixth in 1912
Fiat	6:52:29	72.7	Third in 1912
Mercedes	6:52:57	72.6	Fourth in 1911
White	6:52:58	72.5	Seventh in 1912
Marmon	6:54:53	72.3	Fifth in 1911
Lozier	6:59:37	71.4	Eighth in 1912

FIRST TEN CARS IN 1911

Car	Driver	Miles per hour	Time
Marmon	Harroun	74.8	6:42:08
Lozier	Mulford	74.28	6:43:51
Fiat	Brown	72.7	6:52:29
Mercedes	Wishart	72.6	6:52:57
Marmon	Dawson	72.3	6:54:34
Simplex	De Palma	71	7:02:02
National	Merz	70.3	7:06:2
Amplex	Turner	68.9	7:15:56
Knox	Belcher	68.3	7:19:09
Jackson	Cobe	67.9	7:21:5

FIRST TEN CARS IN 1912

Car	Driver	Miles per hour	Time
National	Dawson	78.7	6:21:06
Fiat	Tetzlaff	76.6	6:31:29
Mercer	Hughes	76.3	6:33:09
Stutz	Merz	76	6:34:4
Schacht	Endicott	73.3	6:46:28
Stutz	Zengel	73	6:50:28
White	Jenkins	72.7	6:52:38
Lozier	Hearne	71.4	6:59:38
National	Wilcox	69.6	7:11:3
Knox	Mulford	66.2	8:53

FIRST TEN CARS IN 1913

Car	Driver	Miles per hour	Time
Peugeot	Goux	75.94	6:35:05
Mercer	Wishart	73.49	6:48:13
Stutz	Merz	73.39	6:48:49.25
Sunbeam	Guyot	70.92	7:02:58.95
Mercedes	Pilette	68.14	7:20:13
Grey Fox	Wilcox	67.65	7:23:26.55
Mercedes	Mulford	66.95	7:28:06.5
Case	Diabrow	66.79	7:29:09
Mason	Haupt	63.47	7:52:35.1
Tulsa	Clark	62.99	7:56:14.25

FIRST TEN CARS IN 1914

Car	Driver	Miles per hour	Time
Delage	Thomas	82.47	6:03:45
Peugeot	Duray	80.99	6:10:24
Delage	Guyot	80.20	6:14:01
Peugeot	Goux	79.49	6:17:24
Stutz	Oldfield	78.14	6:23:51
Excelsior	Christiaens	77.44	6:27:24
Sunbeam	Grant	75.68	6:36:22
Beaver Bullet	Keene	74.82	6:40:57
Maxwell	Carlson	70.97	7:02:42
Duesenberg	Rickenbacher	70.83	7:03:34

List of Prizes and Cash Offers for the 1915 Indianapolis 500-Mile Race

CASH PRIZES FOR POSITION AT FINISH OF RACE										
Donor	1	2	3	4	5	6	7	8	9	10
Indianapolis Speedway.....	\$20,000	\$10,000	\$5,000	\$3,500	\$3,000	\$2,200	\$1,800	\$1,600	\$1,500	\$1,400
†Wheeler & Schebler.....	1,000	500	300	200	—	—	—	—	—	—
*Bosch Magneto Co.....	500	300	200	—	—	—	—	—	—	—
**Bosch Magneto Co.....	100	100	100	—	—	—	—	—	—	—
Emil Grossman Mfg. Co....	1,000	—	—	—	—	—	—	—	—	—
Total.....	\$22,600	\$10,900	\$5,600	\$3,700	\$3,000	\$2,200	\$1,800	\$1,600	\$1,500	\$1,400
†For Cars Using Schebler Carburetors. *For Cars Using Bosch Magnetos. **For Cars Using Bosch Plugs and Magnetos.										

†For Cars Using Schebler Carbureters. *For Cars Using Bosch Magnetos. **For Cars Using Bosch Plugs and Magnetos.

TROPHIES

G. & J. Shield for best time 100 miles.
 Remy Electric Co., Anderson, Ind. Grand Brassard and Trophy for best time 200 miles.
 Prest-O-Lite Co., Boston, Mass. Silver Brick for best time 300 miles.
 Wheeler & Schebler, Indianapolis, Ind. Cup for best time 400 miles.

are the erection of a communal garage, accommodating forty cars, in back of the judges' stand, the old garages having been torn down, and their site turned into parking space; the widening of the track on the inside by 15 feet, and the erection of a concrete safety wall all around.

Gate admission is \$2. Seat prices in addition to the gate admission, range from 50 cents up to \$7, according to posi-

tion; entire boxes are \$60 and single box seats are \$7 and \$10 according to position. Parking space is free, except for those who want reserved space along the first turn and the main stretch. Space along the main stretch is \$10 per car for the front row and \$5 per car for the back row; space back of the pits is \$25 per car and on the first curve \$15 per car for the front row and \$10 per car for the back row.

Valve-in-Head Motor Supreme at Indianapolis

(Continued from page 929)

wise of the car and upright inside the tail, which had a humped camel back to accommodate them. This hump has been cut off, as there is no need to carry wheels on the track so the tail is now smooth and ordinary.

Next in the Peugeot list comes Bob Burman's special car which is a Peugeot with new cylinders, new pistons and new connecting rods. The valve gear is the same as that on Resta's car and the general system is similar, but Burman has cut off 44 ounces of weight from the pistons and a good deal more from the connecting rods. The new pistons are Aloynum and have but a single ring apiece this being very wide, with a deep half round groove cut in the face. This groove catches oil and cares for cylinder lubrication which Burman says was inefficient when first he had the car. The pistons have small holes drilled in them leading to the wristpin which bears in the casting direct, and there is a new oil lead which takes lubricant to the cylinder walls. This lead has two branches and each branch terminates in a double head between a pair of cylinders so that two are fed from each pipe, while there are separate leads to care for the ends of the motor block. Oil is fed under a pressure of 8 pounds per square inch.

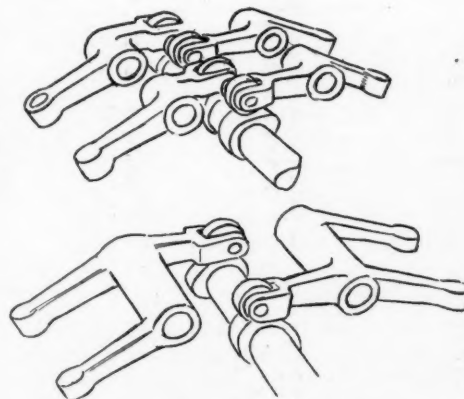
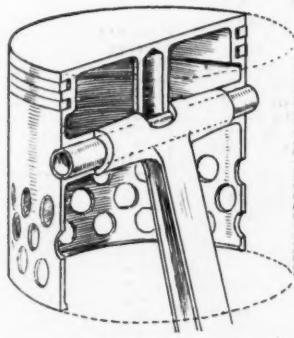
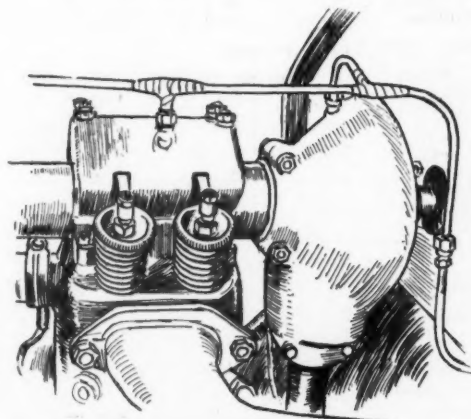
The connecting-rod is a hollow form made from a hand forging, very light, very strong, and, it may be added, very expensive, but it is a really beautiful piece of workmanship.

The remaining Peugeots are far below the capacity limit

and are not expected to show any very wonderful speeds for, though a three liter Peugeot has once been the surprise of a 500 mile contest, it had not so powerful a field out against it. In general design they are much the same as the larger cars, in fact the latter were developed after the success of the three-liter Peugeots in Continental racing had satisfied the Peugeot engineers that the design was right.

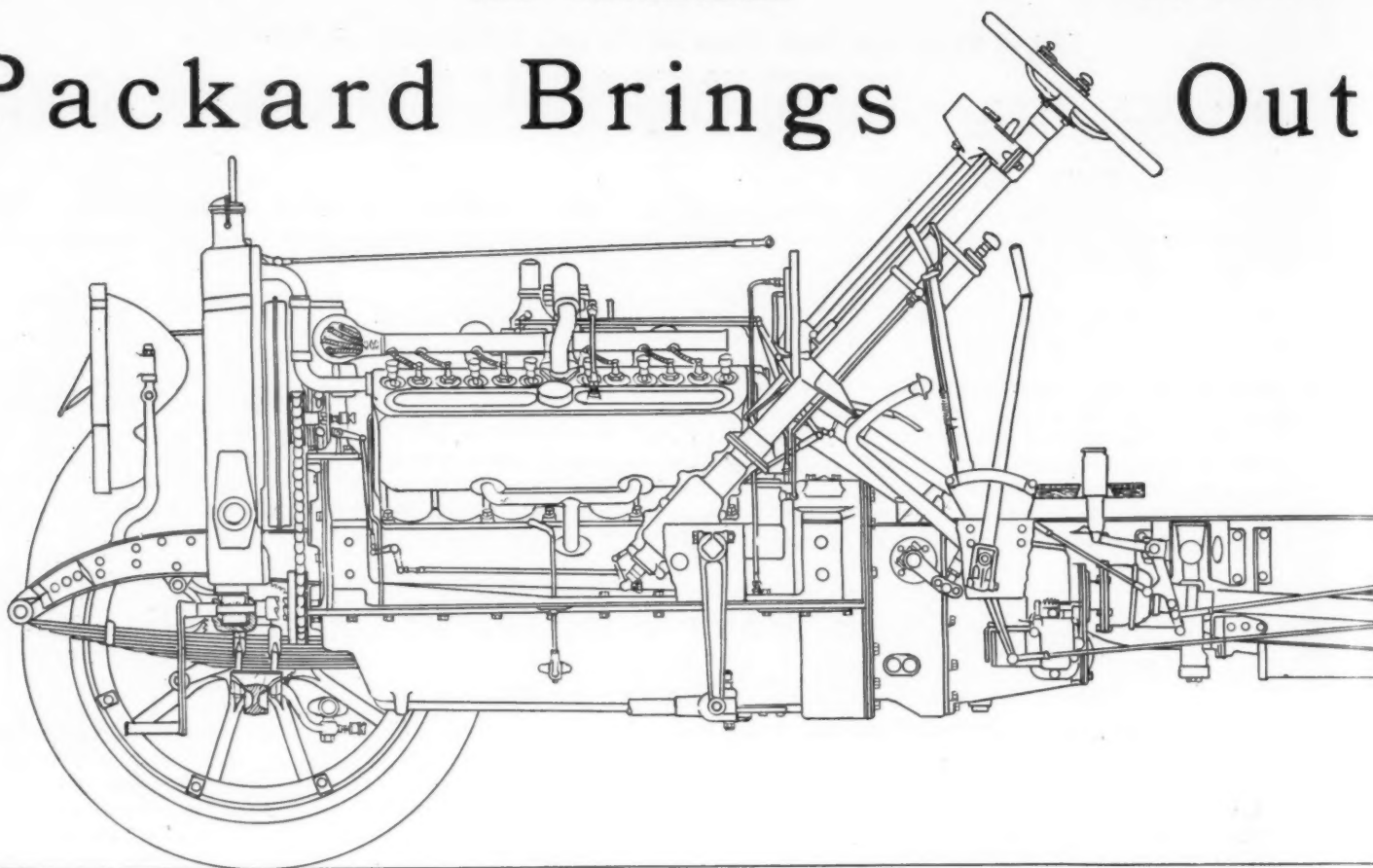
It was an open secret last year that the grand prix Sunbeams were close copies of the 1913 Peugeots, and though there are small detail differences in the motor and many changes in the chassis the statement is true in a broad sense. The motors are almost exactly alike to look at and there is simply a small alteration in the valve operating system. There are two camshafts like the Peugeot, driven in the same way, but instead of using short straight push rods which approximate to a direct action on the valve, the Sunbeams have short rockers. These rockers are not used to bridge a gap between cam and valve, but are simply hinged levers or "fingers." The cam is directly in line with the valve stem head and the finger is there for the cam to wipe against.

Ball bearings are used and oil is fed by sight feeds and pump in the Peugeot way. The pistons are steel with a "leg" which is welded to the center of the head and has its lower extremity resting upon the center of the wristpin so as to give support and help carry away heat from the head. These are the new cars driven by Porporato and Graham.



Left—Mercedes bevel drive for overhead valves. Center—Stutz and Sunbeam type of piston. Upper right—Mercedes uses four rocker arms in valve linkage. Lower right—Stutz with two-rocker arms and two cams for four valves

Packard Brings Out



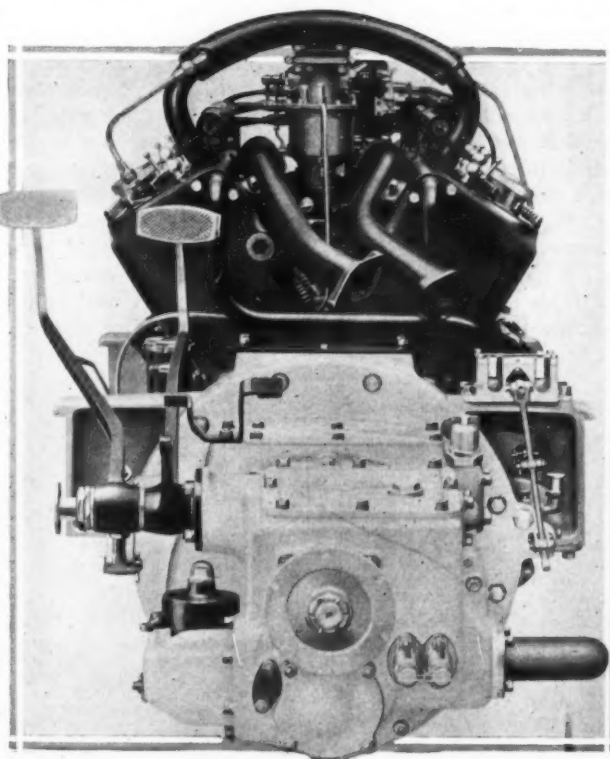
SUBSTANTIATING the many rumors concerning its plans for 1916, the Packard Motor Car Co., Detroit, Mich., has brought out a twelve-cylinder car under the name of the Twin Six. The motor is a completely new design having no connection with the 1915 product of the company and being of high speed capability, embodies the most recent practice in the way of light reciprocating parts, large valve opening, etc. The chassis is neat in appearance, accessibility of parts being an important feature, and the entire construction is the most noteworthy combination of racing motor power with the quietness of the highly developed six that has yet been produced in any part of the world. Never in the history of automobile engineering have the principles of high speed motor design been applied to so large a touring car engine and but little handling of the new Packard is required to prove the result in excess of all possible expectation.

There is no need to go into the pros and cons of twelve-cylinder versus six or eight, as the case was argued along one line of thought in the last issue of *THE AUTOMOBILE*. Suffice it to say, therefore, that there are several reasons which make a twelve-cylinder motor desirable for very high powers. Against it there is a variety of reasons but the balance seems so far

as one can go in theory alone distinctly in favor of twelve smaller cylinders rather than a lesser number of large ones.

The dimensions of the new Packard are 3-inch bore by 5-inch stroke, giving a piston displacement of 424 cubic inches, and it will turn at 3,000 r.p.m. or even more, though the power at low speeds is such that the high end of the range is seldom needed. For the pistons an alloy of aluminum is employed, and the connecting-rods are machined all over so that the reciprocating weight is very small. The pistons weigh 17 ounces complete with rings, and the upper half of the connecting-rod, which is reckoned as a reciprocating mass, weighs 8.5 ounces only, this making the very small total mass of 1 pound 9 1-2 ounces. Now we know that the vibration which may be present in a six-cylinder is due to the weight of the pistons, etc., causing deflections in the crankshaft. Compare then this little piston weight with that in the Packard six-38. This car has a motor displacement of 414 cubic inches, or only 10 less than the present model, but each piston weighed 4 pounds 2 ounces and the total reciprocating mass was 5 pounds 8 ounces. Thus it is easy to see wherein lies the extraordinary smoothness of the twin six.

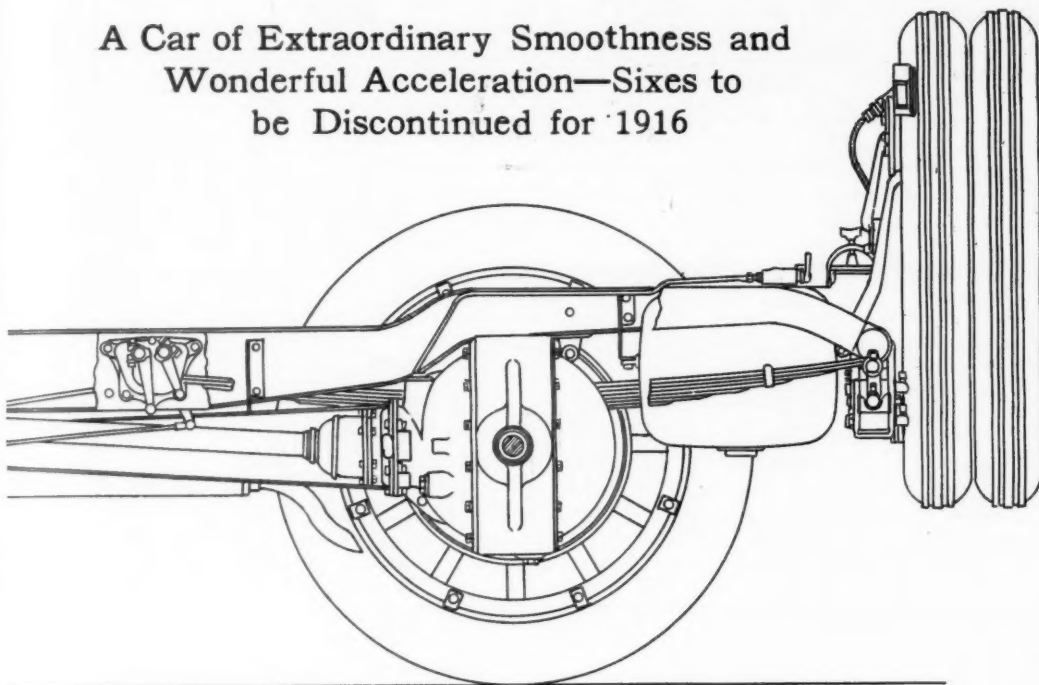
To appreciate this smoothness in combination with high power it is essential to ride in the car.



Rear end of Packard power plant. This shows the small width of the motor but does not do justice to the valve accessibility

Twin Six Chassis

A Car of Extraordinary Smoothness and Wonderful Acceleration—Sixes to be Discontinued for 1916



All that one can say is that the twelve is an attempt to combine the advantages of six and eight and to simultaneously eliminate many of the disadvantages of both. To what extent the attempt has succeeded is a matter for each man to decide for himself, but for *large engines*, a very short experience of the twelve on the road is enough to prove that there is much more in the system than anyone would have imagined.

Layout of the Motor

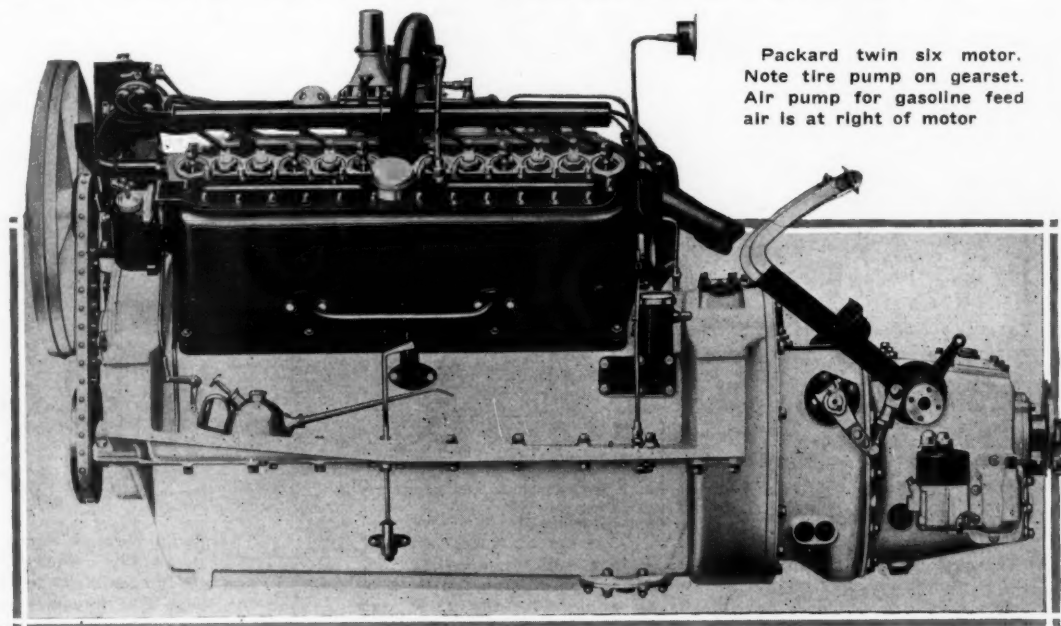
However, to return to the description of the new chassis; the motor has two block castings of six cylinders each set on an aluminum crankcase at 60 degrees, so as to give the best torque, which is obtained with even intervals between the explosions. The valves are located between the cylinders in ordinary L-head fashion, but they are remarkably accessible, because the narrowness of the 60-degree V motor allows the generator and starting motor and the other attachments to be mounted alongside the engine just as in an ordinary four. This clears the valves of all obstruction and the carbureter is placed high enough to be ideal for accessibility in itself and quite out of the way of the valves.

An advantage of small cylinders is that a high compression can be used and a good fuel efficiency

essential. So that there shall be no risks run whatever oil is carried up to the piston pins by little pipes that lie inside the H section of the connecting-rods, but the outstanding feature is the provision of separate leads for oil within the crankshaft. As there are only three main crankshaft bearings, this being quite sufficient for so short a length, there is necessarily one crankpin in each half of the shaft that is not adjacent to a main bearing. To prevent the nearest connecting-rods getting all the oil the crankshaft and crankpins are drilled out with fairly large holes and these holes are divided by driving in lengthwise little strips of steel cut with saw edges so that they bite in and are tight when driven home. This divides the crankshaft interior into two parts and the small holes give each crankpin a separate feed.

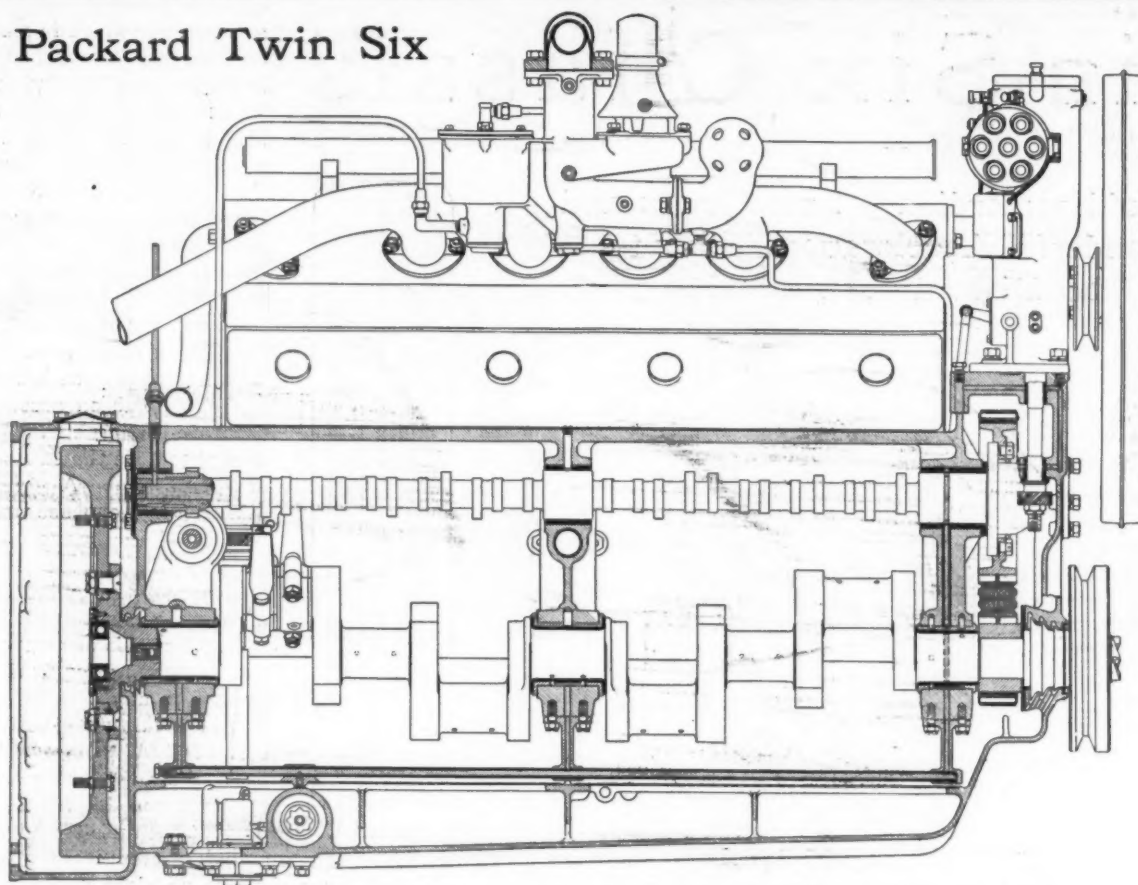
obtained thereby. For example, on a recent run made in this car the average for nearly 200 miles in Michigan was 11 miles per gallon. To get this small cylinder with a high enough compression calls for a small combustion space, while the need for large valves demands the opposite. In order to reconcile these two warring conditions the valves are inclined as regards the cylinder bore which gives room for big valves and yet calls for only a small area of pocket. This has been done before, but it is troublesome on account of the separate setting on the machines needed to bore the two operations out of parallel. A great deal of difficulty and expense in handling is avoided in the Packard cylinders by making everything parallel except the cylinder bore, so all operations such as drilling and facing locate in the same jigs. A special setting for boring would be used in any case so nothing is lost in gaining the better-shaped cylinder head.

To allow the motor to be used at continued high speed, or to prevent such use from injuring it, a high pressure oiling system is

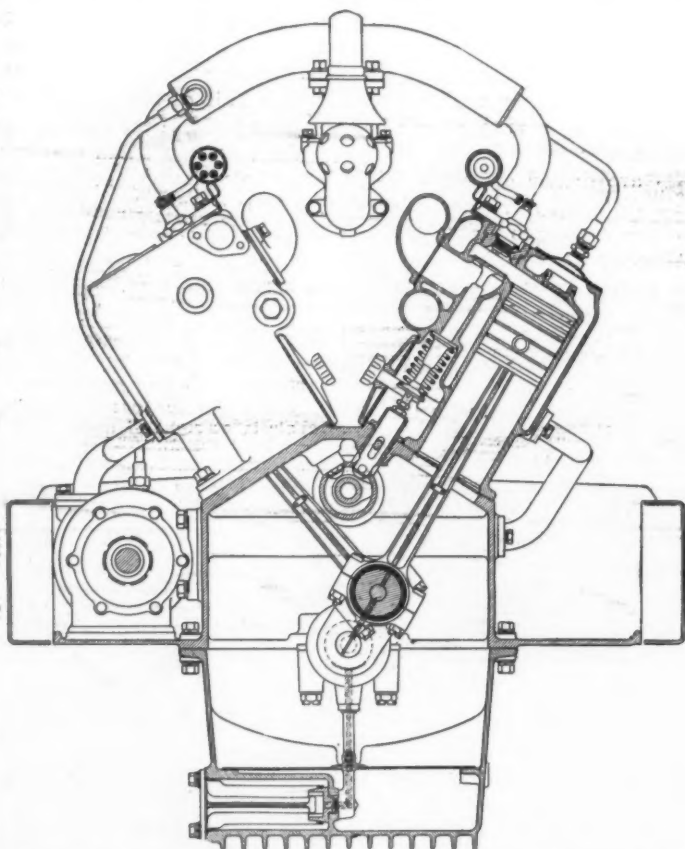


Packard twin six motor. Note tire pump on gearset. Air pump for gasoline feed air is at right of motor

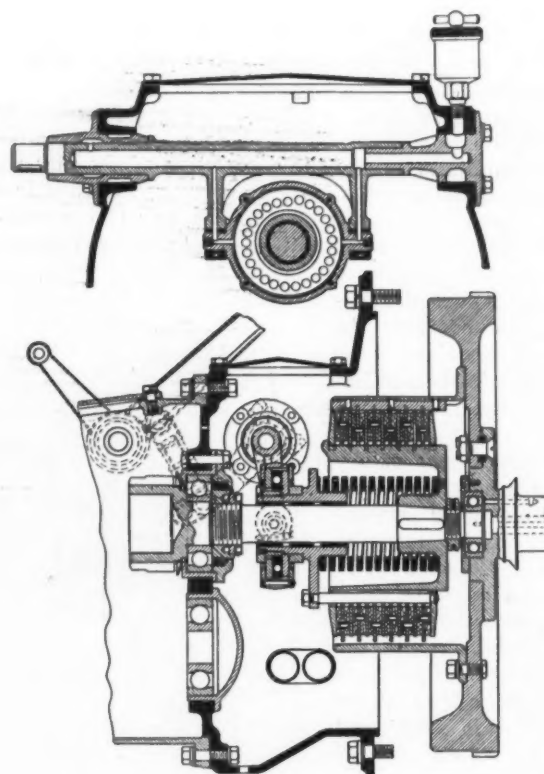
Packard Twin Six



Longitudinal section through Packard twin six motor, showing hollow crankshaft and oilways for main bearings and crankpins



Transverse section through Packard twin six motor, showing the light aluminum alloy piston and connecting rod of high tensile steel. Note how the cylinder bore makes an angle with the valve axis



Sectional view of Packard dry plate clutch. Note that the heavy member is attached to the flywheel and the lighter disks to the gearshaft. Also observe the very light flywheel

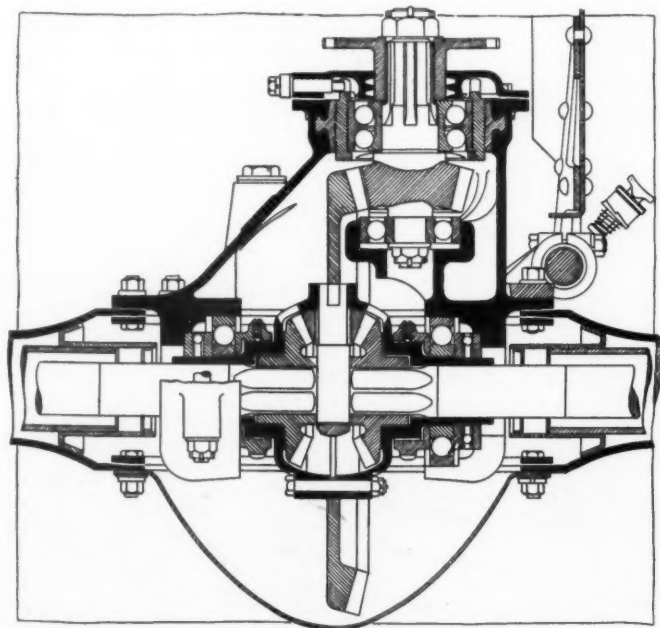
For the supply of oil there is a wide gear pump with helical gears, for quietness, and this has a by-pass within the pump itself. It is thought that the usual place for a relief valve, close to the end of the oiling system, is not so good as at the seat of pressure. Normally the oil registers from 20 to 30 pounds per square inch, but this rises with the motor speed because the by-pass feeds back into the pump intake. There are two screens, one covering the whole base of the crankcase preventing splashing and catching any carbon that might collect and drop from the underside of the pistons. The other is between the pump outlet and the internal manifold and this screen can be withdrawn for cleaning without losing any oil. Besides the crankshaft and piston pin leads oil under pressure is taken to camshaft, generator shaft, air and oil pump shafts and the timer shaft. Overflow from the generator shaft cares for the Morse chain at the front, and every other part is thought of.

Adjustable Chain Distribution

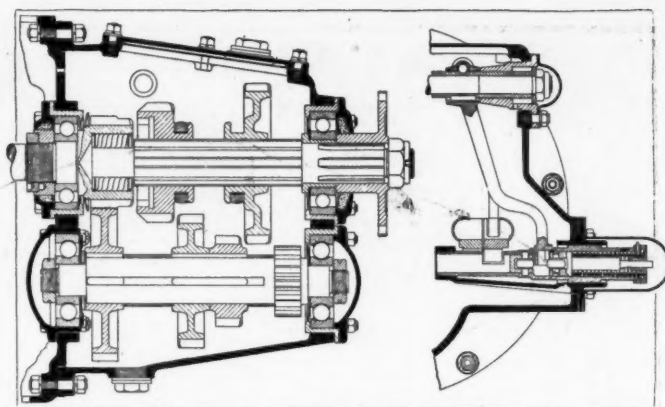
The chain used for the driving of camshaft and generator is adjusted in a unique manner without moving the generator or disturbing the other centers by the novel and somewhat daring method of allowing the generator sprocket to drive the generator through a large Oldham coupling. The sprocket rides on the outside of an eccentric bushing surrounding the generator driving spindle so that turning the bushing shifts the sprocket relative to the other sprockets but does not move the generator. To prevent the occurrence of slack in this coupling, which is always working over a small range, the tongues are tapered and wear is taken up automatically in the event of any wear taking place. This could not be beaten for neatness and, as the surfaces are large, it ought to work out very well.

The lightness thought essential for pistons and connecting-rods has been extended to the other reciprocating parts, as valves and push rods are as devoid of weight as high-tensile alloy steels can make them. This reduces any tendency to noise and, what is still better, permits the use of constant-acceleration, hollow-faced cams which give the best diagram. Only a light valve will follow this sort of cam with a reasonable spring that can shut the valve quietly. The total weight of valve, cotter and tappet is 9 1-2 ounces against 15 1-2 for the old six.

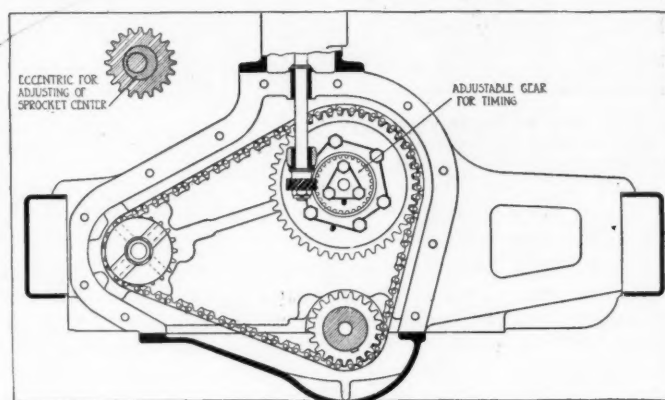
The valve diameter in the clear beneath the head is 1.5



Center of Packard rear axle, showing method of supporting the spiral bevel pinion and the large bearings



Section of gearbox which is integral with Packard motor. Note the very short shafts and the extremely large bearings



Method of adjusting camshaft and generator drive chain and chain layout

inches, the method of adjusting the tappet is normal and the usual cover plate is employed.

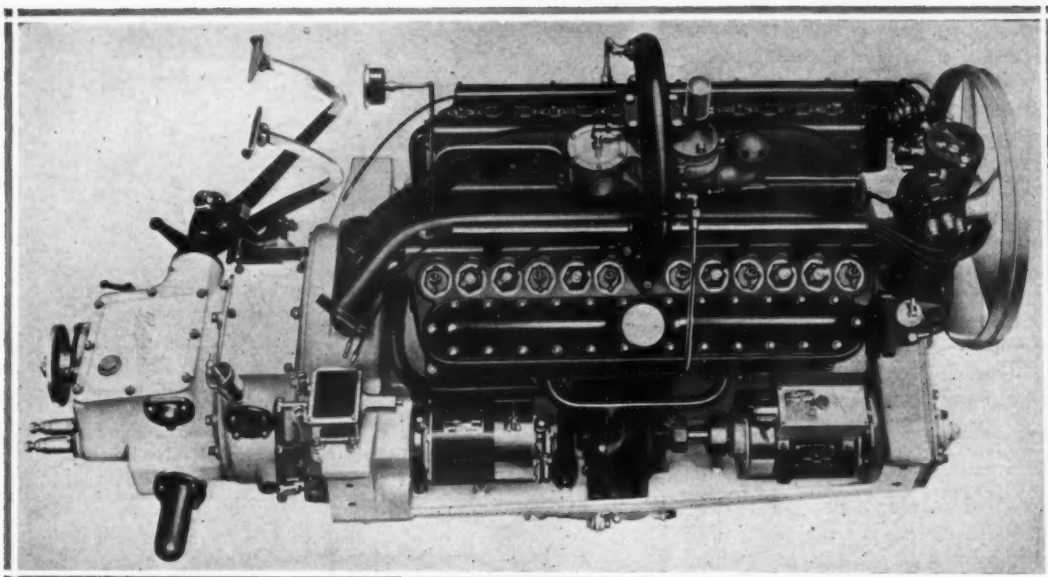
Thermostat Controls Cooling

There is a single water pump driven in tandem with and behind the generator, the supply reaching the other block of cylinders through a large passage cast in the crankcase. This passage is lined with a drawn tube forced in so as to prevent any porosity of the aluminum permitting entry of water to the crankcase. Made up with the pump is a large thermostat controlling two throttle valves on the radiator and by-pass systems, respectively. This is no novelty but it is carried out with great compactness.

In starting and lighting the Bijur constant voltage, two unit system is retained and the location of the parts is shown in the drawings. Ignition is by a timer with both automatic and hand advance, this being a special Delco product with one breaker cam operating two complete six-cylinder systems. This ensures perfect synchronization and good spark at high speed, long duration of contact that is obtained by having the breaker cam running at crankshaft speed. This timer is the only ignition apparatus but it can draw current from the main battery or from reserve dry batteries.

Motor Appears Small

The wiring is a two wire system and there is the usual Packard control platform on the steering column for switches, but this is now smaller and neater. The very useful feature of having one switch which gives head or side lights alternatively with a single finger movement is retained. Owing to the even torque of the twelve cylinders the starting motor cranks at a steady speed and very quietly; there is none of the rising and falling wail of gearing found with the four-cylinder.



Semi-plan of Packard twin six, showing generator, starter and water pump. This view gives a good idea of the carburetor and timer accessibility and also indicates the absence of encumbrances in the V, making for valve accessibility.

One of the most surprising things about the motor is that it appears quite small when its piston displacement is considered. It is short, as a 3-inch bore six would be, and it is quite narrow. Despite the V shape and the fact that the frame is no wider than the old frame there is plenty of room at the sides to reach the electrical gear or the steering. Owing doubtless to the light pistons, for the crankshaft is not very big at 2 inches, no vibration was perceptible up to a road speed of well over 60 miles per hour and the motor is hardly audible even at full revolutions. Air entering the carburetor completely covers all small noises and, being a standard Packard instrument, this noise is not loud. It is possible to exceed 50 miles an hour on second gear and to run on high at 3 miles an hour.

In actual road operation perhaps the most remarkable feature of the running is that there is no sense of effort whatever in opening up from 3 miles on high gear. In a series of trials run against the watch it was found that it was easy to accelerate from 3 miles an hour to 30 miles in 12 seconds on a level cement road and on second speed in a much shorter time. Still, it is not likely that the lower gears would be used for more than a decimal percentage of the running.

Gearbox in Unit with Motor

For the first time the Packard company has broken away from the rear axle gearbox with which it has been identified so long and the illustrations show the small unit type which has replaced the old design. About the clutch there is little new, the dry plate working just as smoothly for twelve cylinders as for six. There is practically no more flywheel than is needed to carry the clutch and to take the gear teeth for the cranking motor and the front end of the clutch shaft runs in a ball bearing spigot housed in the flywheel. The rear end of this same shaft has integral with it the pinion of the constant mesh gears in the gearbox which is hollow and contains a Hyatt roller bearing that forms the gearshaft

spigot. All other bearings in the gearset are large diameter ball, steel protecting flanges guarding the races against entry of dirt or other foreign bodies.

The selective gearshift lever and the emergency brake lever are still carried on the left side of the chassis and the gearset contains a simple but effective interlocking device which positively holds one shifting arm when the other is in use.

In coming to the unit power plant the makers point out that the even torque of the twelve eliminates all risk of rattle in the constant mesh gears and they are taking pains to lighten the axle as much as possible

to reduce unsprung weight to a minimum and so get the best of the new arrangement in every way.

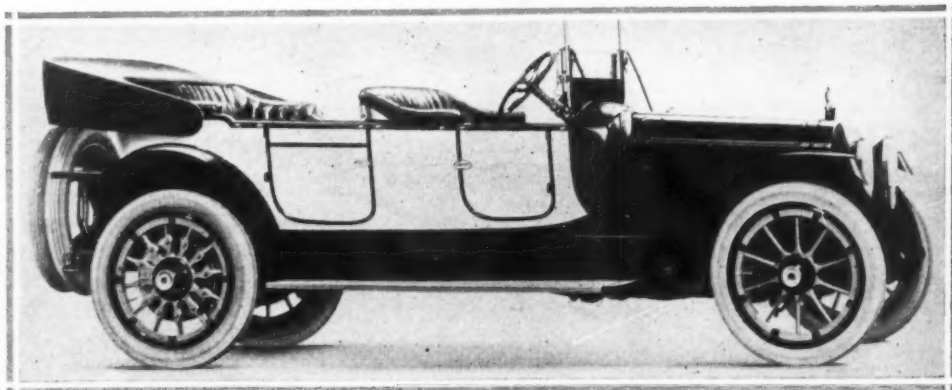
Novelty All Over

This lightness is obtained by using the simplest design of axle with a pressed steel casing and road wheels mounted on the ends of the drive shafts. Aluminum is used for the differential cage and all needless metal removed. Very large ball bearings are used and the mounting of the spiral bevel pinion is interesting because it is carried equally as much by the spigot bearing inside the axle case as by the compound radial and thrust bearing behind it. When spigot bearings of this sort are used they are often much too small to be of any real service but the Packard engineers have found plenty of room despite a gear ratio of a little more than 4 to 1.

There are two universals with telescopic motion, and a stamped steel torque stay is hung from a ball and socket carrier on the rear end of the gearbox.

As the rear suspension is platform type the drive is taken through the springs and the latter are attached above the axle so as to flatten the springs and render them able properly to resist transverse loads which are liable to produce side sway.

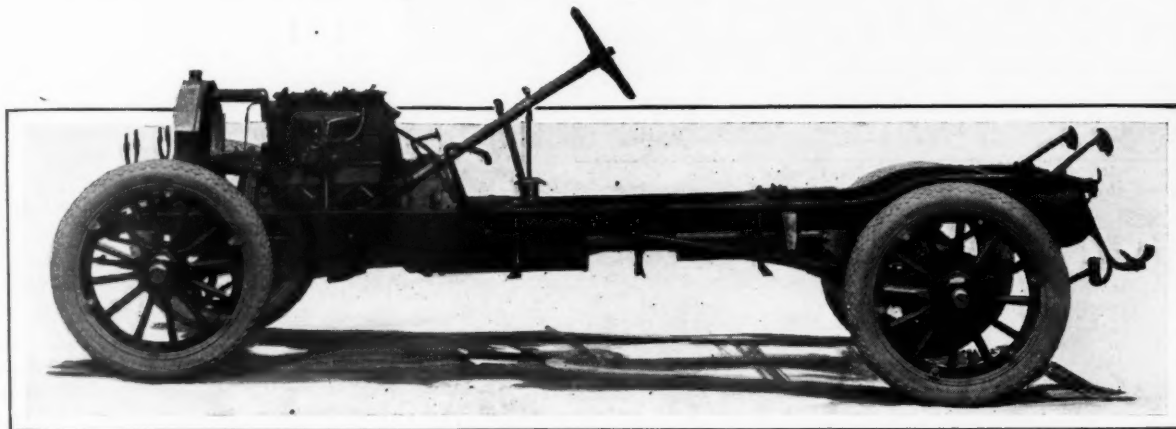
Equipment is unusually complete. Although the price of the car has not yet been fixed, it is expected that increased production will permit a remarkably low figure.



1916 Packard Twin Six, with ordinary open five-passenger bodywork. The general appearance is very like that of the 1915 Packard 38

Oldsmobile Eight Replaces Six—New Four

Larger Body, Longer Wheelbase and
Price Reduction, Features of New Four



Side view of new Oldsmobile four-cylinder chassis, the wheelbase of which is 120 inches as compared with 112 inches on the 1915 four

FOR the 1916 season the Olds Motor Works, Lansing, Mich., has dropped entirely its six-cylinder model 55, and is to market an eight-cylinder design at \$1,295 in addition to continuing its four-cylinder car at a material reduction from \$1,285 to \$1,095, and with a number of chassis improvements, along with a larger body and longer wheelbase.

The news of the Olds factory getting into the eight-cylinder field comes as a surprise, for it was thought that only the four-cylinder type would be built this season. No specific details of the new eight are given out at this time, but it will have much the same general appearance as the four, and wherever possible, to be consistent with the greater power, it will conform to the construction of the four. This standardization makes a better manufacturing proposition, with the result that price could be brought down to the level mentioned.

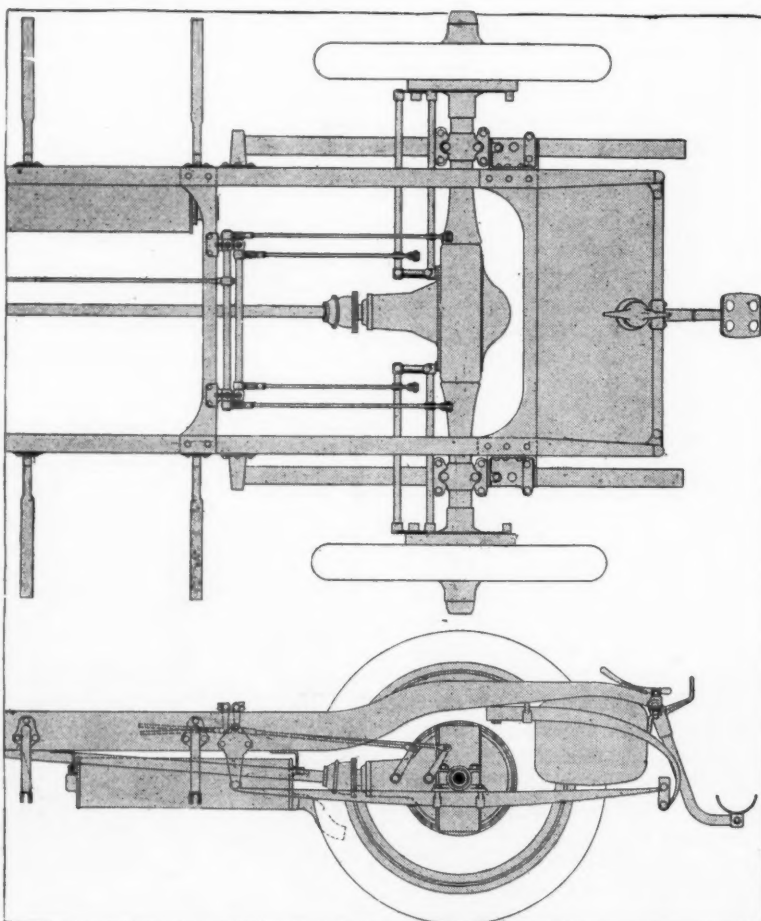
Deliveries on the eight are expected to begin in August, though with the factory working to capacity on the fours at this time, the outsider is impressed with the fact that the Oldsmobile plant

is none too large for the contemplated two-car schedule. It is stated that within a short time the full details of the new eight will have been decided upon, and the public may look for an announcement of them some time before deliveries can begin.

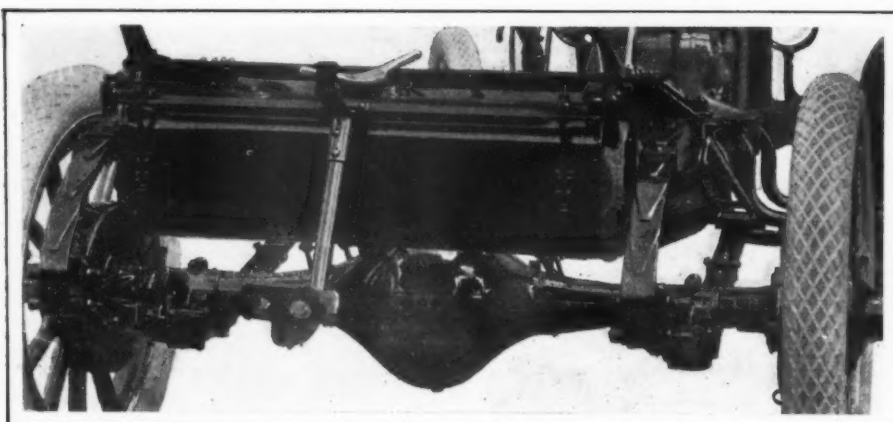
The four-cylinder Oldsmobile, which for the 1916 season is designated as model 43, follows the same lines as its predecessor. The characteristic radiator of German silver, the cowl shape, and the design of the body, with its wide panel running along the top, still distinguish the car.

Chassis 8 Inches Longer

No change whatever has been made in the overhead-valve engine, but the chassis is lengthened from a wheelbase of 112 inches to 120 inches, giving more room for the body, which has been widened and lengthened. In the drive system, the inclosing of the propeller shaft with a torsion tube has been done away with and the open type of shaft is now employed. There is also a change in the frame, which, though as strong as before, is redesigned to require one less cross member. The result of all this chassis



Plan and elevation of rear portion of new Oldsmobile four chassis, showing new axle design and open propeller shaft



A view of the pressed steel axle used on the 1916 Oldsmobile four. This axle is 48 pounds lighter than that used in the 1915 four, due to the pressed steel construction and the new design

alteration is to make a much lighter construction, and along with it a new rear axle is fitted, this having a pressed steel housing instead of the former malleable iron and tubing type. Therefore, although the car is considerably larger and roomier than the previous model, it is really about the same in weight, due to the clipping of so much from the chassis and axle.

The main specifications of the model 43 include 3½-inch cylinder bore with 5-inch stroke, the Delco combination electrical unit, Marvel carbureter, centrifugal pump cooling, splash oiling of the engine, three-speed gearset in unit with the power plant, left drive and center control, and 33 by 4 straight side non-skid tires, front and rear, on demountable rims. A new feature this year is the fitting of the Stewart vacuum fuel feed.

Axle 48 Pounds Lighter

The axle alone is 48 pounds lighter, due to the pressed steel construction and the new design. The former axle had a malleable housing for the differential, with tubing ends to house the drive shafts. The new type is a one-bearing, three-quarter floating construction with the entire housing of pressed steel in halves welded together. A web at top and bottom serves as a re-inforcing element. In its construction, the new axle incorporates the popular spiral-bevel gears instead of the formerly used straight bevel type, and the whole differential unit is mounted on a carrier to allow its removal without disturbing the axle proper. This design is not new, but is a commendable feature. There is the usual large inspection plate at the rear, through which the differential unit can be taken out. Directly under each wheel there is a Hyatt roller bearing, and the pinion bearing is a double-row ND ball bearing. Hyatts are also found on either side of the differential, with thrust bearings just beyond them.

Open Propeller Shaft

The new type of drive, wherein an open tubular shaft is used, is in accord with late American practice, and is a lighter construction than that in which a torsion tube surrounds the propeller shaft to take drive and torque. This new design, which is known as the Hotchkiss drive, provides for drive and torque to be taken through the rear springs with a cushioning effect, preventing jars and shocks being transmitted to the frame. To do this, the master leaf of each rear spring is made stronger, and their front brackets are increased in size. The rear spring front bolt is made 3-4 inch in diameter as compared with a 5-8-inch bolt with the old form of drive. The driveshaft formerly used was a solid section, and though the hollow shaft is lighter it is also stronger and prevents whipping to any extent.

In redesigning the frame, a slightly thicker stock is used.

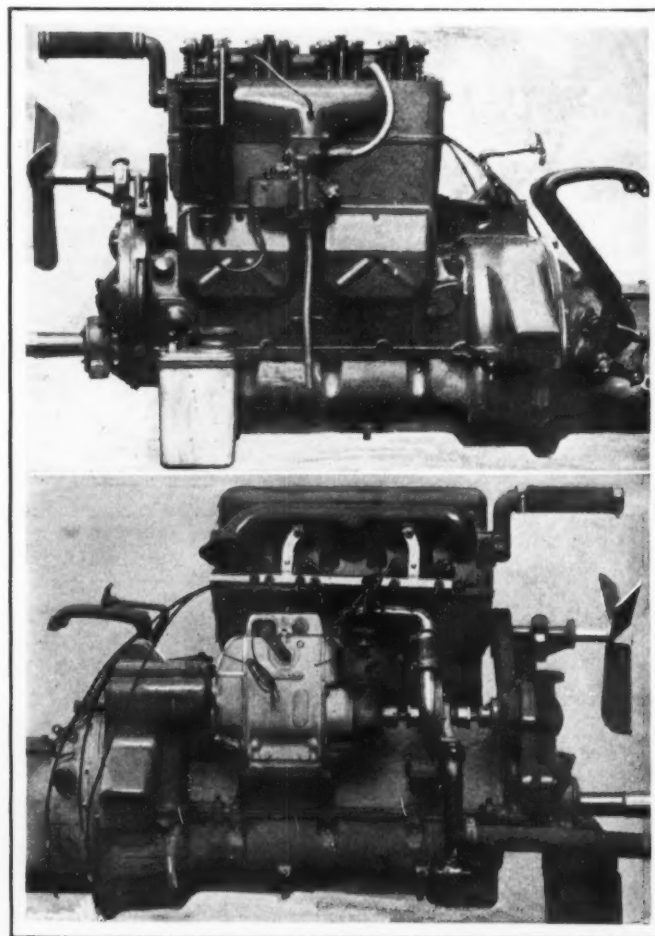
This is 5-32-inch material as compared with the ½-inch metal used in the old frame. The channel has also been deepened from 4 inches to 4½ inches, adding greatly to the rigidity. This new frame makes it possible to do without the cross member formerly placed just back of the motor. In the final analysis, therefore, the new frame, though much stronger than the old, represents a difference in weight of only a few pounds.

The spring suspension has come in for some of the development also. Both front and rear sets are mounted so as to be nearly flat under normal load. That is, the bow or camber usually found in springs is nearly lost sight of in these new springs. The idea is to cause easier riding along with better results on the springs. The usual spring bows upward

enough so that when depressed it rarely becomes flat. If the spring is about flat in the first place, depression bends it slightly to the opposite side of the horizontal, and the action is therefore uniform on both sides of the horizontal, with the result of more equal strain. The spring with more bend usually has its range of action entirely above the horizontal with uneven treatment of the spring.

Springs Are 1 Inch Longer

In order to flatten the front springs they are made 36 inches long, or 1 inch longer than in last year's design



Upper—Intake side of Oldsmobile four-cylinder motor, showing mounting of Stewart vacuum fuel feed tank

Lower—Exhaust side of the motor, showing mounting of the Delco electrical unit

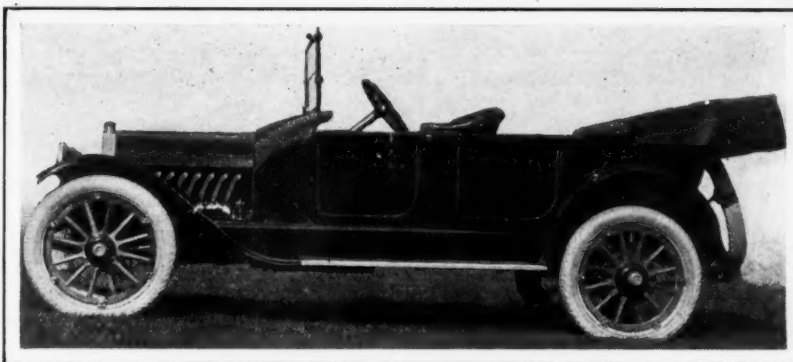
and the front of the frame is bent down more to put the point of attachment nearly in line with the spring pad on the axle. For the rear set, the front hanger is designed to go down lower than it did, and the quarter-elliptic part also bends down further. These rear springs go under the axle. Perfections are used this year, and the leaves have diamond ends instead of round shapes.

Roomy Driving Compartment

In redesigning the body for more length and width, the Olds engineers have produced an exceptionally roomy driving compartment. The front seat width has been increased 3 inches, and the leg room is also enlarged 3 inches. Referring to the touring car, these increases give a length of 41 inches from the inside of the seat back to the clutch pedal. The tonneau measures 47½ inches from the back of rear to back of front seat, giving 3 inches more leg room. The width of the back seat has also been increased 3 inches. Doors are 23 inches wide—1 inch more than they were, and their height has been augmented by 1 inch also. Along with making the body sides higher, the hood has been lengthened 2½ inches so that it will conform with the general body increases and will preserve harmony of lines, a feature which is characteristic of the design.

The Oldsmobile motor has been described on several occasions before, but a review of its features will not be out of place here. With its dimensions of 3½ by 5 inches, it has a displacement of 192.4 cubic inches, and will deliver about 30 horsepower on the block, it is said. The cylinders are a block casting with the gearset and clutch in unit, and arranged for three-point mounting in the frame. The most uncommon point about the engine is the overhead valve construction. Though this is not uncommon in itself, the method of completely inclosing the valve rockers, push rods and springs is unusual. In fact, the push rods run up to the rockers through a cast passage in unit with the cylinder casting. When the aluminum top plate is in place over the valve mechanism the motor presents an exceedingly clean appearance, and on casual inspection might easily be mistaken for an L-head design.

The Delco unit and the centrifugal water pump are on the right side on the same shaft, which is driven through gear connection with the crankshaft at the front. The opposite side is taken up by the carbureter and the Stewart vacuum



Four-cylinder Oldsmobile touring car which sells for \$1,095



Oldsmobile runabout mounted on the four-cylinder model 43 chassis

fuel tank, with the pressed-steel cover plates over the openings to the valve tappets left readily accessible. On the front of the same side is the oil reservoir which is a part of the lower half of the crankcase.

Detachable Cylinder Head

The cylinder head is detachable, and it carries the entire valve mechanism, together with the intake manifold. Distribution of the gases from this manifold is effected within the head casting, while on the opposite side are the four openings to the exhaust header, which is a separate piece. Thus the head is really the "business" part of the engine, and the construction makes it very nice when any work on the valves is to be done, or when it is desired to reach the cylinders or pistons.

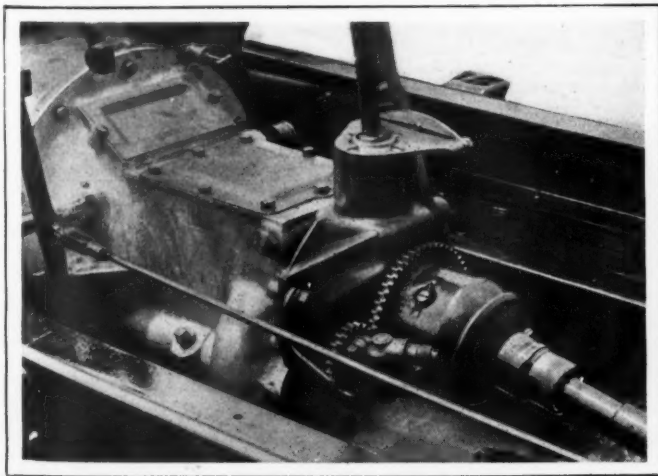
Both the crankshaft and the camshaft have three bearings, mounted in the upper part of the crankcase, which is integral with the cylinders. The crankshaft has a substantial flange, to which the 14-inch flywheel bolts, and the front gears are spirally cut to prevent noise. Drive for the propeller type of fan is by a flat belt from a pulley on the pump shaft.

The Delco apparatus is the standard single-unit type with the ignition distributor a part of the motor-generator. As a generator the unit is driven by the pump shaft, but when acting as a starting motor, gears are shifted by a pedal into mesh with the teeth in the flywheel rim in the usual way. There are two sets of gears in the train connecting starter to engine, but both sets are out of mesh when the unit is not required for starting. These afford a reduction of about 25 to 1, and permit the cranking of the engine at about 125 r.p.m. The reduction gears are housed compactly in an integral box on the right rear supporting arm of the power-plant. The electric system operates on 6 volts, and the storage battery is carried in a metal box under the front seat.

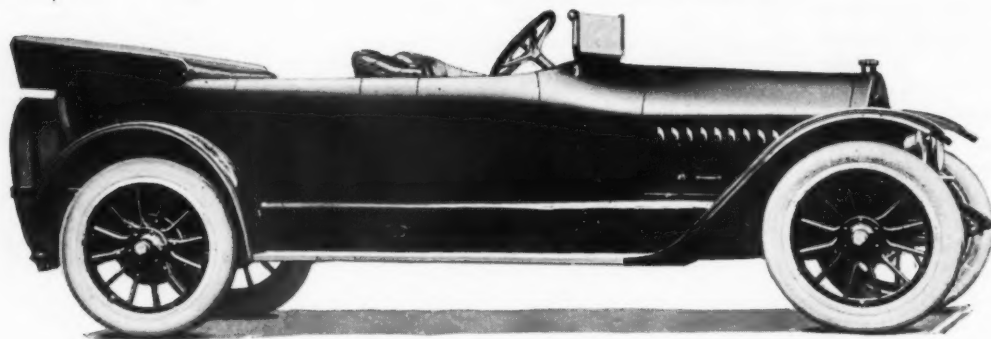
Lubrication by Splash

Lubrication is by splash, with a pump to force oil up to a dash gauge, from which point it runs by gravity to the

(Continued on page 950)



Rear view of gearbox used in four-cylinder Oldsmobile, showing speedometer drive off the propeller shaft



National Highway Six which sells for \$1,690. Built as a four or five-passenger design, two auxiliary folding seats make it a six or seven-passenger car

National Adds a Twelve and a Six

Twelve Has V-Design 60-Degree Motor 2 3-4 by 4 3-4, Giving 339 Cubic Inches Displacement — Larger Six To Be Continued

THE National Motor Vehicle Co., Indianapolis, Ind., has a twelve-cylinder car as one of its new series models for the coming season. Nearly a year ago when the eight-cylinder motor was first announced as a stock production in this country it was at once hinted that concern or so would bring out twelve-cylinder designs for 1916. Little attention was at that time paid to these rumors but this week has substantiated them and the National is one of the first to announce a twelve as a stock model.

This new twelve will be manufactured entirely in the company's factory in Indianapolis and already has been on the road for some time. Shipments will begin in August. To date the motor has greatly exceeded the expectations of its designers in the matter of power generated and smoothness of running. It is much lighter, volume for volume than the six design and is as accessible as a four or six.

This new National will sell at \$1,990 as a four or five-passenger car and can be had at slight additional expense as a six or seven-passenger job. It is made with 128-inch wheelbase and carries 36 by 4 1-2-inch tires.

The twelve-cylinder motor has cylinders of 2 3-4 by 4 3-4-inches bore and stroke, giving a piston displacement of 339 cubic inches. The motor is a V design, six-cylinders at one side and six at the other side being thus mounted in two groups at an angle of 60 degrees as compared with the 90-degree angle used in eight-cylinder V motors. This results in a narrower overall design. Compared with a six-cylinder power plant of approximately the same overall dimensions, this new twelve has 12 per

cent. more piston displacement and weighs considerably less, a fact which goes to prove the argument that in twelve-cylinder motors it is possible to increase the number of cylinders and yet reduce the weight.

The motor is equipped with a Westinghouse starting and lighting system; and some chassis characteristics include three-speed gearset, cantilever rear springs, floating axle and a steering gear which permits of turning the car in a 33-foot circle. The body is an accentuated streamline design and the radiator a National with some modification in curves.

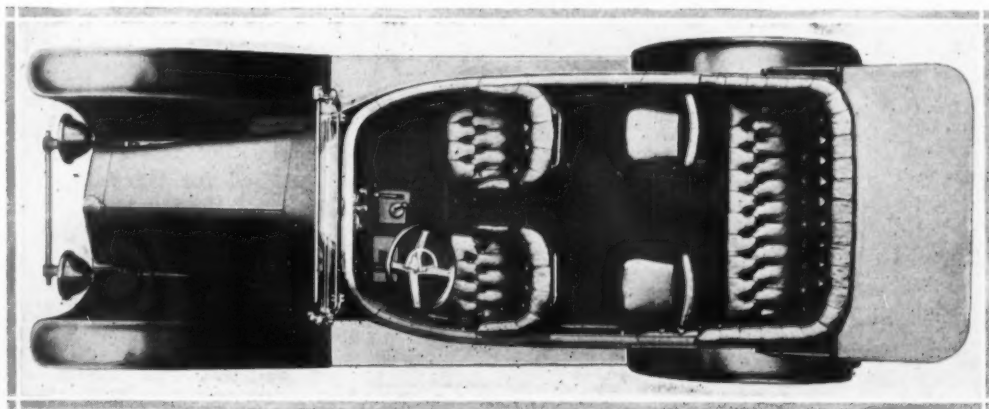
This new twelve is not a drafting-room creation but has been running for some time and has been well tested out on the block as well as in the chassis. A few details of designs have not been

finally completed which prevents the reproduction of photographs in this description.

But the twelve is not the only new National model for next year. There is a new six, the Highway Six at \$1,690 which is a lower price than National cars have ever been marketed at heretofore, in fact, it is the first time a National touring car has been listed below \$2,000. This new Highway Six carries out practically all of the ideas of design set forth in the six which the company featured during the present year and which will be continued next season in practically the same form at \$2,375.

The Highway Six, however, incorporates some features new in National design and in general is a long, low and roomy vehicle, accommodating four or five passengers and two additional tonneau seats converting it into a six- or seven-passenger car.

In appearance the new Highway Six is attractive, the body being what is known as the tumble-home design, that in which the sides curve inwards at the top, giving a convex effect. Viewed from front to rear, the body lines are of the boat type



Plan view of the new National Highway Six, showing the aisle between the front seats, the two auxiliary folding seats and the movable driver's seat. The folding seat behind the latter is also adjustable to correspond with it. Note ample space in tonneau and driver's compartment

with the widest part in rear of the front seat. The seats are placed low, that for the driver being adjustable so that it can be moved forward or backward on two slides, with a couple of thumb screws to hold it in the desired position. The auxiliary tonneau seat immediately in the rear of the driver is also mounted so as to be correspondingly adjusted fore or aft, according to the position of the front seat. The front seats are individual types with a passageway between them.

The motor, a block design with valves on one side, has cylinders 3 1-2 by 5 1-4 giving a total piston displacement of 303.1 cubic inches and an S. A. E. horsepower rating of 29.45. The motor is claimed to develop 48 horsepower. In design it is a smaller edition of the larger six of this season but differs in one respect, namely, in that a Stewart vacuum-gravity gasoline feed system is used, this being the only National model on which it is used for next season and marking the first use of it by this company. With it a 1 1-4-inch side inlet carburetor is used and the gasoline tank is located under the body at the rear, being so placed that the rear of the body is practically in the same vertical plane as the rear of the tank, this resulting in very little overhang of body or other parts back of the rear axle.

All through the car reduction of weight has been one of the primary objectives and it has been accomplished by a general cutting out of useless weight, this pruning process not being local to any particular points but general throughout. By this method over 600 pounds have been eliminated as compared with the weight, were the conventional practices of the present season followed out, bringing the total weight to 3,000 pounds.

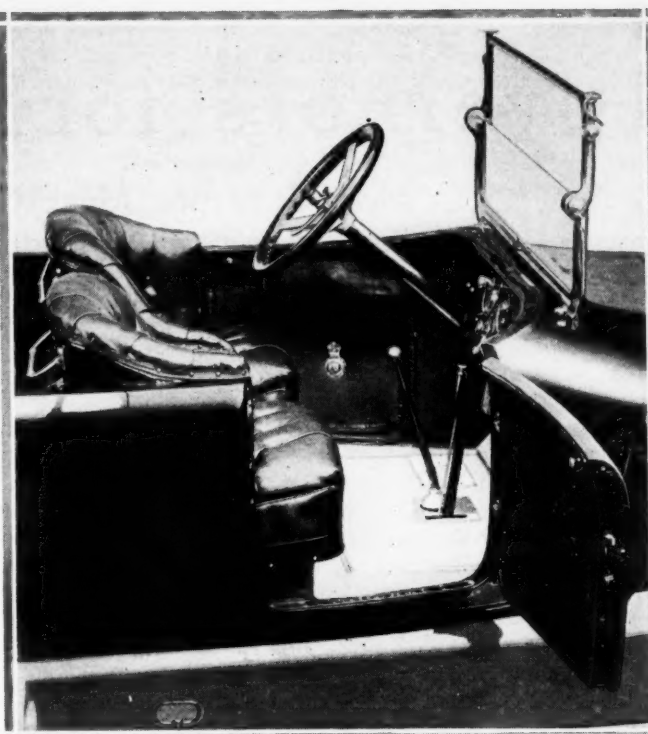
Throughout there has been a careful selection of materials, alloy steels playing a very general part. All gears in the gearset and rear axle are chrome-nickel alloys with the possible exception of the rear axle pinion which is of nickel steel. All shafts in the gearset and axle are of chrome-nickel. The front axle is a nickel steel forging and the frame a high-carbon steel product.

The body is hung approximately 1 1-2 inches lower than is common with such designs, this being partly accomplished by heavily dropping the front axle between the steering knuckles and the spring seats. By heavily bottle-necking the frame in front it is possible to turn the car in a 33-foot circle.

Returning to a more detailed consideration of the motor, for the first time it is noticed that the National company has mounted the electric generator and magneto on the same side. The usual National four-point motor suspension is used which obtains a flexibility to avoid twisting from the frame due to one bolt attaching each motor arm to the supporting bracket, these four bolts lying fore and aft and acting as swivels. This method of support has been used by the company for 5 years. Cast iron valves are used having a diameter of 1 9-16 inches in the clear and with a lift of 3-8-inch. The single camshaft is gear driven; a high-tension magneto giving a single ignition system is used and the Westinghouse starting and lighting system is fitted.

The three-speed gearset is a unit design with the motor and from it power is transmitted through a tubular propeller shaft with a universal joint at each end. The rear axle is a floating design with spiral bevel drive and tapered roller bearings used throughout. Annular ball bearings are used in the gearset. Spring suspension includes a set of semi-elliptics in front with the National design of flat cantilever in rear, the cantilever taking the driving effect of the rear axle and transmitting it to the frame. A torque arm is employed. Front springs measure 38 by 2 and rears 48 by 2 1-2 inches.

Service brakes are contracting types operating on 14 by 2-inch drums and emergencies are expanding designs. The wheelbase measures 128 inches; tires are 34 by 4 1-2 inches all around; and equipment is complete, including one-man top, Jiffy curtains, windshield, speedometer, electric horn, power tire pump, ammeter, gasoline gauge and the usual tool

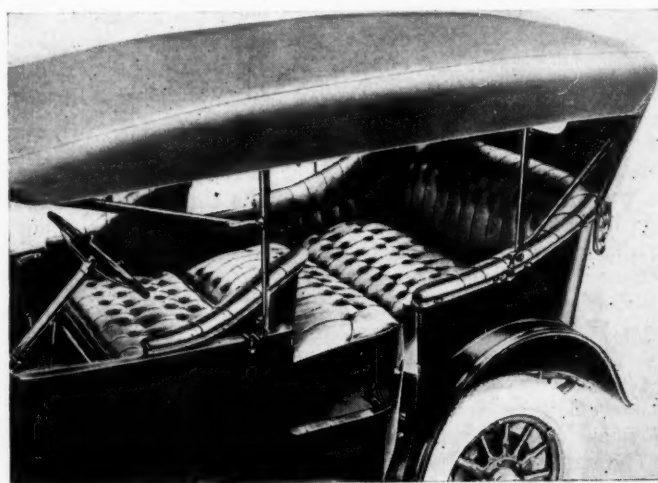


Driver's compartment of the National Highway Six. Note rounded body sides, aisleway seats and tool locker in front door

equipment which is carried in a special compartment in front at the driver's left. The adjustable steering column is on the left with change speed and brake levers in the center.

Jackson Builds Standard Touring Car Sleeping Body

JACKSON, MICH., May 20—There have been a good many makeshift bodies produced by amateurs with the idea of providing sleeping quarters when on tour. The accompanying illustration shows a standard type of car now being sold by the Jackson Automobile Co., this city. The back of the front seat is held in the upright or normal position by strong catches and is just as rigid when up as a body of ordinary sort. When lowered it rests on folding steel legs and the cushion of the rear seat is made of such a shape that when turned round it makes a level surface with the rest. This type of body will be supplied at an additional cost of \$25.



Sleeping body manufactured as standard type by the Jackson Automobile Co., Jackson, Mich., and supplied for \$25 additional cost

Governors for Motor Vehicles

Ideal Governor Must Control Power, Must Be Sensitive, Flexible, Regular and Steady and Should Co-operate with Valves for Proper Gas Delivery

By Theodore Douglas*

A Paper Read Before the Metropolitan Section of the Society of Automobile Engineers

IN power generating machines generally, whether large or small, the best engineering practice demands some form of automatic governor, to make them, broadly speaking, self-regulating. This requirement in a somewhat different form, the automatic self-limiting of speed, applies with special force to vehicle engines, and particularly to commercial vehicles, as power units, because of their high first cost, the trying conditions of their service, and the uncertain dependability of their operators. This opinion was forcefully expressed by A. J. Slade, Chairman of the Research Committee on Governors of the Metropolitan Section of the Society, at one of its meetings: "Any truck motor that has to stand up in service year in and year out must have a speed governor to restrain it from racing," etc. Truck engineers and truck users alike are demanding more and more some automatic form of protection against the misuse of their equipment. Ignorant drivers do not appreciate the destructive effects of the abnormal strains resulting from excessive vehicle and engine speeds to which trucks are constantly subjected, and to resist which they were never designed.

Small Motors a Factor

Apart from the protection of the vehicle against abuse, there are other very important considerations favoring an automatic control; these considerations are the employment of the efficient modern high-speed engine, the employment of smaller engines, and increased efficiency both in time and in fuel. However capable and conscientious the driver, there are limitations to the effectiveness of personal control, which are inherent in the method, whether the means employed are for hand or foot. If for the former, providing relatively non-vibrating parts, the limitations of personal action are serious obstacles to the success of the method. The pedal control of the engine will give the driver greater manual freedom to respond more quickly to the requirements of the service, but, on the other hand, owing to the constant vibration of the vehicle, particularly in commercial vehicles using solid tires and having spring equipments less able to absorb minor shocks, the foot of the driver is in constant motion, causing the pedal to vibrate in a greater or lesser degree, dependent on its design. However good the pedal design may be, the driver's foot will vibrate, and its slightest movement acts directly upon the throttle-valve and causes the gas flow to the engine to be uneven. This has a bad effect on the carburetion, as no carbureter has been designed which will deliver an economical mixture with a constantly vibrating throttle. Further, there must be considered the influence of the personal factor, since even the best of drivers in the course of a day's operation will seldom reach the high point in his efficiency curve, and, like men in other forms of employment, will generally work far below it.

The motor vehicle governors in commercial use today may

be divided broadly into three classes, namely: First, gas-velocity governors; second, hydraulic governors, and third, centrifugal governors.

Of the first class, gas-velocity governors, I know of but one make offered commercially—the Kramer. The action of such governors is dependent on the inertia of the gas mixture, or its velocity, in passing from the carbureter to the engine, acting on an automatically regulating admission valve. They limit directly the maximum gas-velocity, and indirectly the engine speed. In considering the efficiency of such governors it should be remembered that a gas of given mixture at a given velocity has a definite thermal value. This thermal value may be sufficient to develop a high speed in an idling engine, whereas this same gas at the same velocity if admitted to the same engine laboring under load may not be sufficient to develop even an efficient engine speed when called upon for a real power effort. Such a design probably does not contemplate maintaining a uniform engine speed, as it cannot respond to the gas and horsepower requirements of the engine under greatly varying loads. This design rather contemplates limiting the maximum speed of an idling engine, and for that purpose is probably efficient.

Of the second class, hydraulic governors, also only one make is in use commercially—the Packard. This governor is dependent for its action on the head or pressure of the water in the circulating system of the engine, acting on a flexible leather diaphragm, the movement of which is transmitted to a gas-regulating valve located between the carbureter and the engine. Such a design permits of a definite throttle-opening for a definite engine speed, irrespective of load. The general efficiency of the design is, however, dependent very largely on the type of valve employed, the condition of the linkage and diaphragm, the normality of the water temperature at the engine speed, and the slippage in the pump as a result of wear.

Of the third class, centrifugal governors, there are many types, subdivisions and varieties, and this class probably includes 95 per cent. of all the governors employed today. Such governors may be subdivided broadly into two groups, namely:

- a. Constant-engine-speed governors which limit the engine speed directly through curtailing the gas flow, and
- b. Constant-vehicle-speed governors which limit the vehicle speed directly through its influence on the engine, and indirectly the engine speed, through curtailing the gas flow or by grounding the ignition. The non-ignition method, owing to the many and serious objections to it, can have only a very limited application. Other methods, such as a reversed control of the exhaust and inlet valves, have been employed, but have found slight acceptance.

Constant-Engine-Speed Governors

Governors of this group are driven directly from the engine, and are so connected to a governing valve, situated between the carbureter and the engine as to reduce the gas flow when the speed of the engine exceeds the speed for which

*President, Duplex Engine-Governor Company, Incorporated, New York.

the governor has been set. With these governors, when a gear is changed, the permissible speed of the engine is not altered; the engine is permitted to operate, as on the prior gear, at its fixed maximum. With such a governor set for a maximum engine speed of 900 r.p.m. a vehicle speed of 15 miles per hour on high gear, of 11 miles per hour on third gear, of 6 miles per hour on second gear, and of 3 miles per hour on first and reverse gears might result. The possible vehicle speed drops as the driving ratio, engine to wheel, is less. The maximum engine speed remains the same for each gear, and hence in the process of dropping into a lower gear, no power advantage results, except the mechanical advantage of an increased gear leverage. The commercial vehicle designer employing such a governor is forced to make a compromise between length of engine life and possible power development, and as he increases one he decreases the other proportionately. Within the limits of its design, other factors being equal, the power output of an engine is proportionate to its speed. In order to operate his engine on high gear at a reasonably low speed, to secure length of engine life, etc., the designer is compelled to sacrifice power on low gears where greater power is needed. It is a very common thing to see a commercial vehicle engine limited to a maximum speed of 900 r.p.m. by its governor, when the design of the engine has been such as to have made it perfectly safe, when greater power was needed on low gears, to speed the engine up to 1,200, or even to 1,500 r.p.m., thus adding 33 or 66 per cent. to its possible power output.

By a careful study of the current consumption of electric vehicles in trucking service it has been found that the power requirement for the high gear service of commercial vehicles averages about 30 per cent. of the rated power capacities of their engines. It has been further determined that a commercial vehicle will operate, as an average, for 90 to 95 per cent. of its travel on high speed. It hence follows that the gear ratio on high determines, at least to the extent of 90 to 95 per cent., the average piston travel of the engine of any given vehicle. This average piston travel is an important factor in influencing its life, efficiency and upkeep cost.

If only 30 per cent. of the rated power capacity of the engine is required for more than 90 per cent. of the vehicle travel, it follows that the engine during that extended travel is operated on a very much reduced throttle, and at a low efficiency. It would seem good engineering to so adjust the gear ratio on high as to reduce the engine speed to a point more closely corresponding to the actual power required, operating the engine on a fuller throttle and at a higher efficiency; or to employ a smaller engine.

Constant-Vehicle-Speed Governors

To overcome the objections to the former group of governors, constant-vehicle-speed governors have been designed, which influence the permissible engine speed through the vehicle speed. Such a governor is operated from one of the vehicle wheels, or from the propeller-shaft, and permits the vehicle to attain its maximum speed on high gear at a moderate engine speed. This reduced engine speed tends to prolong the life of the total equipment, to lessen the cost of upkeep, and to increase the fuel efficiency. As the drive is stepped down through the gear train, however, such a governor, aiming at a constant vehicle speed, allows an increased engine speed inversely proportionate to the gear ratio, which is ordinarily such as to permit of a prohibitive engine speed on second gear, and an absolutely destructive speed on low and reverse gears. In neutral, the engine is entirely free from the influence of the governor, and is permitted to race.

The Butterfly Valve

In the various governors already referred to, with but one exception, the butterfly valve is the type of control valve em-

ployed. There are many objections to it. It is very sensitive to vibrating influences. In addition to the pedal influence upon the valve, it is also influenced by every suction impulse of the engine, giving rise to valve flutterings, and to a correspondingly irregular working effect. This type of valve has the further disadvantage of constituting a brattice (to borrow a term from the vocabulary of the ventilating engineer) in the gas passage, having a tendency, on deflecting the flow toward the walls of the gas chamber, to cause the ingredients of the mixture to separate through differences in skin friction. Other objections are the 70 to 90 degrees of angular travel required of the valve in moving from its open to its closed position and vice versa and further that in that travel the open area of the valve does not increase and decrease proportionately to its angular movement.

It is conceded generally that all of these governors have serious limitations, yet it has been the policy to employ them on the assumption that the disadvantages resulting from omitting them would be far more serious than those resulting from using them, and that they are at least a safeguard against many abuses.

The Ideal Vehicle Governor

The qualities which an efficient vehicle governor should possess can be summarized as follows: power, sensitiveness, flexibility, delivery, regularity, and steadiness.

Power. This is the most important quality of a governor, and upon it, and its proper balance, will depend very largely its efficiency. To possess this quality effectively the governor must be static, that is, be a one-speed, one-position governor.

Sensitiveness. This quality is dependent on a positive increase and decrease in power between small variations of position, and hence of speed, and the difference in speed between any two positions must be small.

Flexibility. The governor should be capable of maintaining the power output of the engine closely proportionate to the power requirement, regulating to low engine speeds for high gear service, where low power is required, and to higher engine speed for low gears when the maximum power capacity of the engine can be effectively employed.

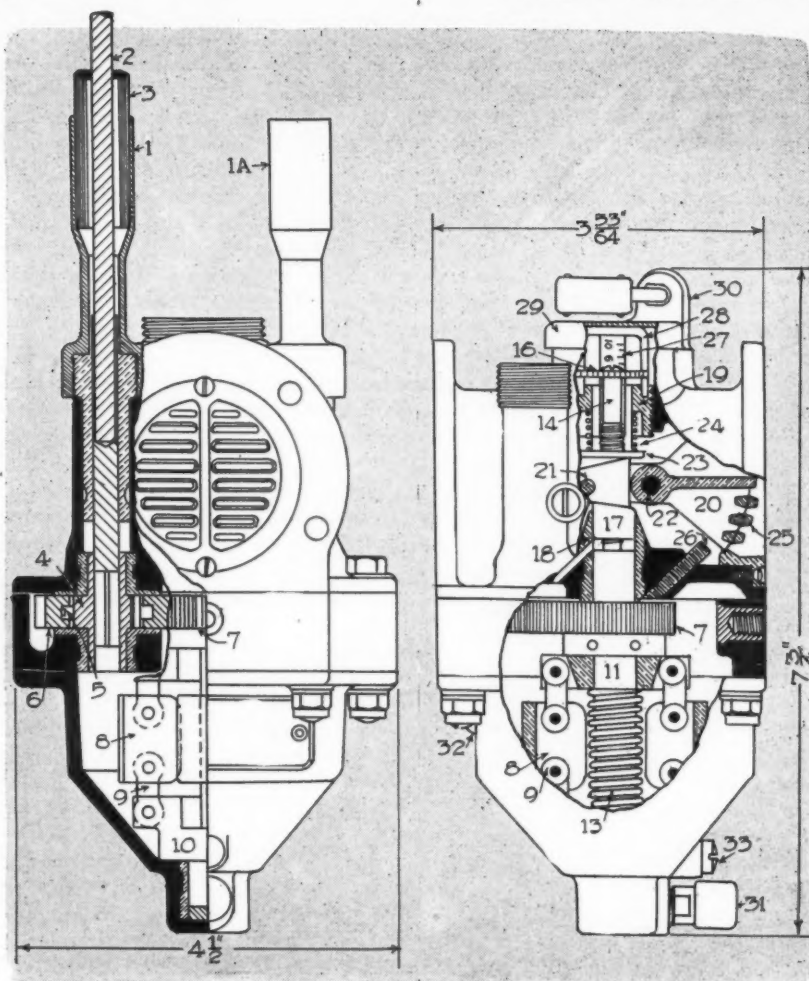
Delivery. This quality is dependent largely on the type of control valve employed. The governor construction should be such as to include, and to co-ordinate with, a valve of such design as to require but slight travel in effecting its extremes of position. The valve should be non-fluttering, of low resistance to the gas flow, and offer, in the automatic control of the engine, full throttle, when necessary, until practically the moment of required cutoff is reached.

Regularity. The governing influence, power and valve closure should vary proportionately as the speed; or, between the extremes of the governor range the differences in power and closure between any two required intermediate positions, should be equal.

Steadiness. By this is meant a smoothness of control, free from surge, valve, flutter, or hunting. The valve should glide, rather than be jerked, from one position to another. It is obvious that a vehicle governor should be fool-proof, tamper-proof, durable, and of reasonably low cost.

The Duplex Governor

This is no occasion for a discussion of the principles of the conical pendulum, or circular motion, or of the properties of centrifugal force. I will simply state relative to the mechanism of which I am the designer, that it is a static, spring-loaded, centrifugal governor provided with a valve and linkage of special design. By a static governor is meant that type of centrifugal governor which will maintain its revolving weights in a definite position for any given speed, and which is capable of resisting external influences which may tend to alter their position; in other words, a one-speed, one-position governor. Such a governor will assume a certain



Sectional views of Duplex governor. Left—Fig. 1. Right—Fig. 2.

position for each speed, and for each position it will develop a certain power. The power should be sufficient to quickly adjust the fuel admission valve, with a view to minimizing fluctuations in speed, thus giving the engine the property of self-regulation, within narrow or broad limits, depending on the design.

In this mechanism the centrifugal member, valve member, and adjusting member are all consolidated into a single unit within an inclosing shell which is interposed between the carburetor and the intake manifold of the engine so that the entire gas supply must pass through the valve. On each side of the valve chamber provision is made for the insertion of a speed terminal, 1 and A1, Fig. 1, one conveying to the governor a proportionate vehicle speed, and the other conveying a proportionate engine speed. The engine speed may be conveyed from the timing-gears, camshaft, magneto-shaft, etc., and the vehicle speed from the propeller-shaft, gearset, or jackshaft. The speed conveying means 2 consists of a one-quarter inch, sixteen strand, steel cable revolving in a hard fiber casing 3. Each terminal connects with an automatically one-way acting springless pawl clutch unit 4. The means for actuating the pawl is a drag piece 5 having sufficient frictional bind for that purpose. The floating members of these clutches consist of gears 6 in mesh with a third gear 7 mounted on the shaft of the centrifugal members. The clutch engaging speed, which is imparted to the centrifugal member, is the higher of the two speeds, whether of the engine or of the vehicle. When the engine is idling the engine speed will actuate the governor. The engine is always under governor control. As an example, consider a vehicle in which maximum vehicle speed on direct drive will be attained at 800 r.p.m. of the propeller-shaft. The drive being direct, the corresponding motor speed will also be 800 r.p.m. The speed relations may be so established that at a maximum governor speed of 1,000 r.p.m. the engine is controlled. Then if the governor drive for vehicle speed control be taken from the propeller-shaft and stepped up to 1.25 to 1 the maximum governor speed of 1,000 r.p.m. will be reached at the maximum vehicle speed which corresponds to 800 r.p.m. of the propeller-shaft and engine. This constitutes the governor

drive from the vehicle. If the governor drive from the engine be taken from the camshaft at 1.33 to 1 of camshaft time, the speed of the governor drive from the engine would be only 533 r.p.m. at 800 r.p.m. engine speed. The engine speed would have to reach 1,500 r.p.m. before the governor speed would reach 1,000 r.p.m. and the engine be controlled. Thus when the vehicle is in motion, and is being propelled by the engine on high gear, the speed imparted to the governor by the vehicle will be the higher speed and will govern the engine. This may be also true of third gear, whereas on low gears the governor speed from the engine will be the higher and will hence control.

An analysis of the above example will show the following facts:

The engine is under governor control at all times.

The vehicle is always under governor control when propelled by the engine.

The difference between the maximum engine speed for high gear and low gears is 700 r.p.m.

The average vehicle speed for low gears will probably have been increased 40 per cent.

The available horsepower, over high gear capacity, assuming a modern high-speed engine of good design, will have been increased 87 per cent.

The average commercial vehicle today is very much overpowered, and the use of the constant-engine-speed governor is very largely responsible for this tendency. It is also largely responsible for the needlessly low gear ratios for high-gear service in commercial vehicles. These high gear ratios have been made low in order to increase the engine speed to a point at which the engine will be capable of developing the amount of power judged necessary for low gear service. The conventional high-gear engine speed for commercial vehicles varies from 900 to 1,150 r.p.m. Had the vehicle above referred to been equipped with a constant-engine-speed governor, its engine would have been limited to 800 r.p.m. for all gears, and its greater power capacity might just as well have been absent, since it could not be utilized. If a 40 horsepower engine with its power limited to 25 horsepower is sufficient for a given service, why buy, operate and maintain one of 40 horsepower? Why not instead install one of 25 horsepower and operate it efficiently, thus producing a cheaper, better and more economical vehicle?

Detail Construction

The centrifugal member of the governor under consideration revolves in a chamber entirely separated from the gas chamber, and in an oil spray. This chamber contains all of the moving parts of the governor, excepting the valve and valve sleeve which are in the valve chamber. There are four weights 8, supported by toggle-links 9, and connected at one end to a collar 10 slidably mounted on the centrifugal governor shaft 11, Fig. 2, which is hollow. The other end of the weight linkage is rigidly connected to the shaft and to the gear 7. The shaft is provided with a transverse slot, not shown, in which moves a transverse pin 12, Fig. 3, carried by the collar 10. This linkage is held in its extended position by the spiral spring 13, the compressing of which constitutes 70 per cent. of the load of the centrifugal unit.

The valve stem consists of two parts, 14 and 15. Part 14 has a notched wheel head 16 by which it may be screwed into or out of the valve adjusting sleeve 17 at will. This part of its stem extends all the way through the valve chamber and into the end of the hollow centrifugal shaft 11. The second part of the valve stem 15 is a pushrod floating in the hollow shaft. The valve adjusting sleeve 17, which is made of a tin alloy, is supported at one end in the bearing 18 of the centrifugal shaft, and at its other end in the bushing 19. The valve adjusting sleeve 17, which has a short sliding motion in its bearings, is linked to the movable valve part 20 by means of the bronze pin 21. The movable valve part is supported on a transverse axis by a bronze shaft 22, its movement on this shaft being small. Between the bushing 19 and a shoulder 23 of the adjusting sleeve 17 there is a spiral spring 24 under approximately five pounds compression. The function of this spring is two-fold; first, to endeavor to always keep the valve 20 in a full-open position, and second, to provide an adjustable fraction of the load on the cen-

trifugal member, approximating 30 per cent. of that load. This spring is set at the factory and its compression should never be changed.

The valve is of grid construction, and consists of two parts, 20 and 25, each having a latticed surface. The fixed member 25 is set into the upper part of the valve chamber and is provided with elongated slots, running parallel to the axis of part 20, with walls flaring from its under side upward. Below this fixed part is the movable part, having a corresponding series of slots with walls flaring from its upper surface downward. The movable part has an arc movement across the slots, and is supported by means of a substantial bearing 22. The maximum travel of this movable part, in a size D governor, is approximately 1-16-inch, and in that small travel effects all degrees of aperture between full-open and full-closed valve. When the openings of the rigid part coincide with the openings of the movable part, the valve is open, and when the bars of the rigid part cover the openings of the movable part, and vice-versa, the valve is closed. The two parts of the valve have a ground fit, though their surfaces are not in contact. The movable part is held in open position by means of spring pressure, as shown, and its possible motion, in both directions, is limited by stop screws 26. This construction and support of the valve frees it from the influence of car vibration. The openings of the valve constitute elongated venturi. This design was adopted with a view to the wire-pulling of all the gas passing through the valve, to the keeping up of the gas velocity, and to the better mixing of ingredients.

Operation

On speed being imparted to the centrifugal shaft by means of one clutch gears 6, the weights expand, drawing forward the sliding collar 10 and the transverse pin 12. The only load carried by the centrifugal member up to this point is the compression load of spring 13. When, however, in its forward movement the pin 12 encounters the end of the floating valve stem 15, and pushes the part 14, held rigidly in 17 by means of the thread, part 17 is pushed forward, compressing the spring 24, and commencing to close the valve. Not until this point has been reached does the centrifugal member pick up its full load. The load characteristics are so proportioned to the centrifugal force developed as to make the governor almost isochronous for all governor speeds from 700 to 1,300 r.p.m. It will be observed that there is no positive connection between the valve linkage and sliding collar. If there were, any movement of the collar would alter the position of the valve and a full throttle would be impossible except for speeds below that speed at which the centrifugal force developed would be capable of carrying the load of spring 13.

Setting the Governor

The valve stem 14 may be screwed in or out of the adjusting sleeve by means of the notched wheel 16. The further it is screwed in toward the floating part 15 of the stem the less will be the travel required of the sliding collar to engage 15, and to close the valve. The further it is screwed outward the greater will be the travel required. Therefore, in setting the governor, the stem is screwed in for low speeds and out for high speeds, as required. The scale 27 indicates the valve or speed setting. After setting, the yoke 28 is so adjusted over the end of 16 as to engage two of its notches to prevent the stem from turning, yet permitting of its sliding motion with the adjustable sleeve 17. The cap 29 is then screwed into place, preventing any ingress of air, and protecting the adjustment by the pin 30, and a lock or seal.

All parts in the valve chamber are of aluminum, tin or bronze, while spring 24 is of phosphor bronze. All bearings throughout the governor are of bronze, and all of the steel parts in the centrifugal chamber are specially heat-treated. The sufficiency of the materials and workmanship employed in its construction has been shown in its durability. Careful inspection after fourteen months of continuous service has shown no wear. There presumably was wear, but it was not visible. The lubrication required consists of a few drops of oil in the cup 31 daily, and the draining out of the old oil through the discharge 32, and the addition through 33 of one-quarter of a pint of medium weight machine oil every 2,000 miles. In one test the governor was operated for 1,500 miles without any lubrication whatever beyond the initial addition of one-quarter pint of oil. Inspection showed no harmful results and sufficient oil in the centrifugal chamber for an additional 500 miles.

The average increase in the efficiencies and capacities of the trucks of three companies which have adopted the type of governor under discussion as standard equipment, one of which companies had been using a gas-velocity governor, and two companies three types of constant-engine-speed centrifugal governors, was, as closely as could be determined, as follows:

Increased ton-miles-per-hour	27%
Increased available horsepower	42%
Increased gasoline efficiency	23%
Increased acceleration	40%
Decreased piston travel	7%
Decreased radiator temperature	15°

This governor makes possible the employment of engines 25 per cent. smaller than are now used on trucks with constant-engine-speed or gas-velocity governors. This was conclusively shown in the extended investigations of one company*, in which one of their small engines equipped with this type of governor, competed with a 25 per cent. larger engine equipped with a gas-velocity governor, one truck trailing the other on a cross-country run over hilly roads, in which all of the conditions of chassis, load and road were the same. In these competitive tests the little engine beat the big engine in ton-miles-per-hour 23 per cent., in gasoline efficiency 48 per cent. and in acceleration 50 per cent.

Comparative dynamometer tests for power and speed control have been run in the laboratories of two engine manufacturing companies with results showing no drop in power output, and with a speed variation of less than 5 per cent. in dropping and picking up the load at the rate of fifteen times per minute, or two seconds for each change. It is obvious that no vehicle operation could ever duplicate this adverse condition. The tests for maximum power showed a smoother engine operation with the governor than without it.

Advantages

The following are the more important advantages of the governing method under discussion:

It will provide a control of engine speed at all times.

It will provide a control of the vehicle speed when propelled by the engine at all times.

It will handle the vehicle under load more smoothly than the best operator.

It will use the compression of the engine on down grades to brake the vehicle, thus easing the wear and strain on the braking equipment.

As compared with all other governors it will increase the ton-miles-per-hour of the vehicle, its gasoline efficiency, and its acceleration. It will make possible a 5 to 15 per cent. decrease in the average piston travel, and will proportionately lengthen the vehicle life and lessen its cost of upkeep. It will make possible the employment of smaller engines and the using of high-speed engines at high efficiencies. It offers special advantages on fire apparatus where high engine speeds are required for pumping, and relatively low engine speeds for vehicle travel. On gasoline-electric machines where series windings of the electric motors and high engine speeds are used for low vehicle speeds, and the control employs parallel windings for high vehicle speeds, it is indispensable.

This governor is made in three sizes, suited to engines having piston displacements of 300 cubic inches, 300 to 500 cubic inches, and 500 to 800 cubic inches. It is contemplated that larger sizes will be added to this list.

*Thomas B. Jeffery Company, Kenosha, Wis.

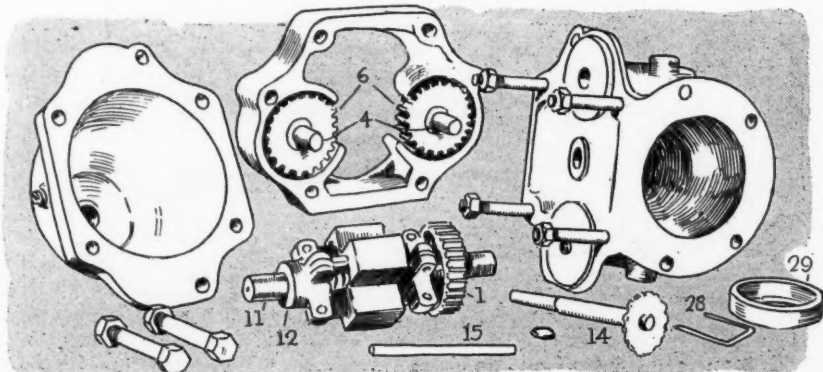
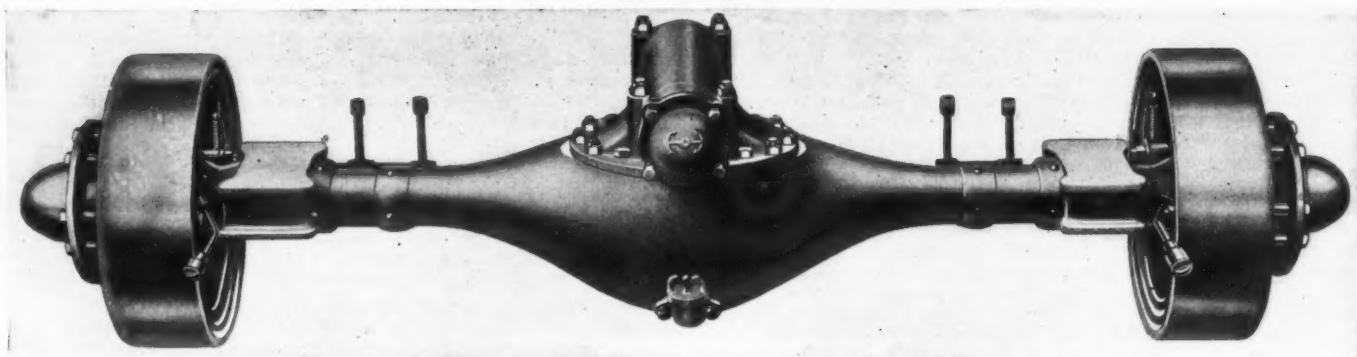


Fig. 3—Duplex governor disassembled



The new Sheldon worm gear drive rear axle designed for light delivery cars of 1,000 pounds capacity

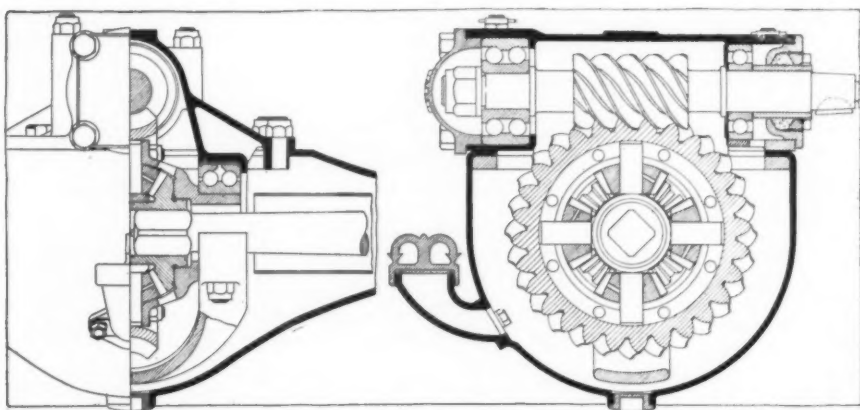
A New Sheldon Worm Gear Axle

Design for Light Delivery Cars of 1,000 Pounds Capacity
—Special Formula Metals Used for Worm and Wheel

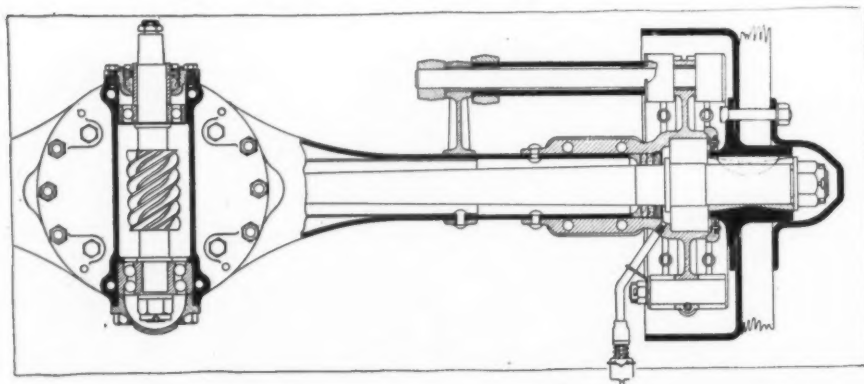
THE Sheldon Axle & Spring Co., Wilkesbarre, Pa., has installed the tools, jigs and fixtures necessary to manufacture the new worm gear rear axle suitable for light delivery cars of 1,000 pounds capacity. This worm drive for this size car has been experimented upon for over a year with test trucks and the company is now ready to put it upon a production basis. Announcement is made that a large quantity has already been arranged for by a firm which will market a delivery wagon of 1,000 pounds capacity

at less than \$900 with full equipment ready for the road.

The axle is designed along the same lines as the larger Sheldon worm gear axle, incorporating the straight type of worm and wheels in a semi-floating axle construction producing a simple axle of relatively few parts and light weight. The housing is pressed steel and is pressed and riveted to cast steel spring seats and brake spiders. A special feature, as will be noted in the illustrations is the mounting of the hub on the axle shaft by means of taper bushings. This permits the wheels to be easily removed without the aid of a wheel puller which is often not at hand when most needed.



Vertical sections through new Sheldon worm drive rear axle



Plan section, showing mounting of hub on axle shaft by means of taper bushings, permitting the wheel to be easily removed

Double Internal Cam Brakes

Double internal cam brakes are used 1.75-inch wide operating against 14-inch pressed steel brake drums. The use of the internal brake permits of a clean exterior appearance as all the parts are housed within the drum where they are also protected from mud splashed by the wheels. The shoes are malleable iron lined with Thermoid, and the arrangement has been designed so as to permit of the use of non-skid chains without any danger of interference with the brake lever. The latter are extended inside the frame and are mounted in hardened and ground bushings which, it will be noted from the illustration, are amply provided for in the way of lubrication.

Uniform Stress

The axle shafts are 2 inches in diameter at the outer bearing and are tapered from the bearing collar to the differential. The reason for this is to provide a uniform stress at all sections of the shaft. The materials used in the shaft are 3.5 per cent. chrome-nickel steel drop-forged. They are heat treated to give an elastic limit of 125,000 to 150,000 pounds per square inch.

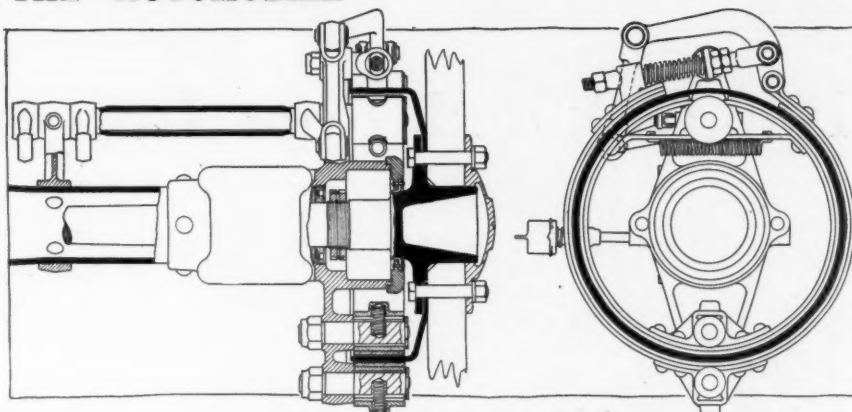
A special secret formula of steel is used for the worm and after the heat-treatment has been accorded, the manufacturing proc-

ess calls for grinding and polishing. This puts a smooth finished surface on the worm and at the same time eliminates any distortion that might have taken place during the heat treatment. As the grinding is done to within close limits, the finished worms are all of a size within very close tolerances, permitting of perfect interchangeability at this point. The worm has five starts, 3.75 lead, 30 degrees 50-minute lead angle, 30 degrees axial pressure angle, 26 degrees 22.5 minutes normal pressure angle.

A special formula is also employed for the bronze worm wheel which has thirty-one teeth of 1.75-inch space. Both the material in the worm and worm wheel have been selected as the result of long experiment in this direction and both the material and the heat treatment accorded are kept as secrets by the manufacturer. A forging is used for the differential case and the differential gears and pinions are heat-treated alloy steel.

Friction Resistance Minimized

Special attention has been paid to the bearing mounting of this axle in order to keep the frictional resistance as low



Illustrating the double internal cam brakes used with the new Sheldon worm gear rear axle. Shoes are malleable iron and drums of pressed steel

as possible. Ball bearings are used throughout and as will be noted in the accompanying drawings the design has been such as to keep frictional resistance as low as possible and at the same time provide a large factor of safety in the bearing mounting. This provides a complete rear installation for a truck of this size and one which is essentially a high-class job with the additional feature of being economical in manufacture and assembly.

Splash Oiling for Step Piston Motor

THE eight-cylinder engine in which the cylinders are vertical and arranged concentrically one above the other in tandem appears first in the U. S. patent office about 1884, and at various intervals since. In 1900 and up to 1905 several patents were issued here and in Europe showing this type of cylinder.

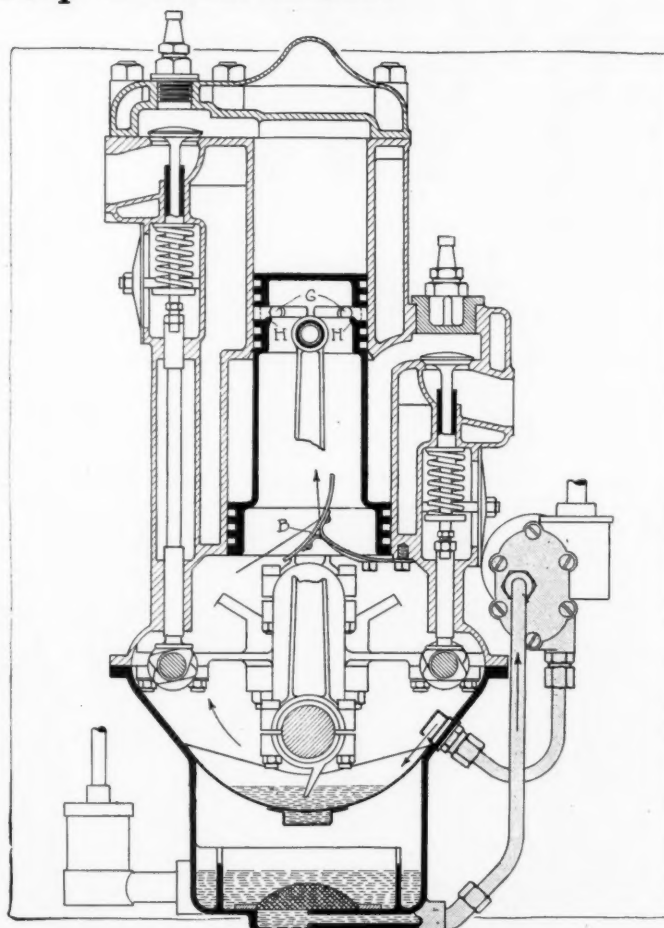
During 1901 and 1902, the type was tried in Europe extensively, but owing to the imperfect lubrication, particularly of the upper, or small, cylinder, and other difficulties, it was abandoned.

E. M. White, a consulting engineer, Detroit, Mich., who has invented several unique oiling schemes for splash lubrication which have proven successful, now offers a design of tandem eight, which he claims overcomes this inherent oiling difficulty and, though the general design is probably not new except in details of construction, the method of oiling is decidedly novel. The White is the only design of tandem eight, of which there is any record, to introduce the oil to the cylinder walls through holes in the pistons and between the two sets of rings. This is undoubtedly the first motor of the design to lubricate the upper piston by the splash system.

In order to lubricate it by this method, White makes use of the baffles, which he also fits to other types of engines, and the principles of which were explained in a recent issue. The lower cylinder walls are lubricated by the plain splash from these troughs, but the upper set have the special baffle provision. A part of the oil splashed is thrown around and onto the baffle plates B which act to shoot it directly up into the upper pistons, as shown by the arrows.

All around the inner side of the piston there is the ledge or pocket G, which catches this oil sprayed up by the baffles. Then it goes out through the comparatively large holes H and onto the cylinder walls.

NEW YORK CITY, May 21—Gasoline consumption during 1915 will run over 1,000,000,000 gallons, according to an estimate based on the fact that the number of new cars purchased in 1915 is equal to the number purchased in 1914. The increase in gallonage, assuming the rate of increase in new cars is the same, will be around 300,000,000 gallons, or about 30 per cent.



Section through tandem eight-cylinder motor designed by E. M. White, showing unique system of splash lubrication in which the oil is introduced to the cylinder walls through holes in the pistons and between the two sets of rings. The lower cylinder walls are lubricated by splash from the troughs. Part of the oil is thrown around and on to the baffle plates B which shoot it to the upper pistons, where it is caught by the pockets G and fed to the cylinder walls through the holes H

1916 Oakland Four Larger—Price Lower



Arrangement of instrument board and control members on four-cylinder Oakland model 38

SEVERAL slight mechanical improvements, an increase in the front size of the body and a material reduction in price to \$1,050 for all three types—touring car, roadster and speedster—are the conspicuous points about the new four-cylinder model 38 of the Oakland Motor Car Co., Pontiac, Mich. Its general appearance and its features of design are the same as the model 37 which it supersedes. The old prices were \$1,200 for the touring car and \$1,150 for the roadster, so that in one case the reduction is \$200, and in the other, \$150.

Rear Springs Underslung

In looking at this Oakland model, one is impressed with the good lines and with the way in which the low hanging of the chassis has been attained. Oakland was one of the first to underslung the rear springs from the axle, and it has developed this feature until now a very racy appearance is given the cars with consequent ability to hang to the road at speed.

The outstanding feature of the new models over those of last year is the greater height of the cowl, hood and radiator, lending a suggestion of more power and size to the cars. While this increase is but 1 inch, it is an improvement. Along

Hood and Radiator Are Higher—Power Plant 2 Inches Shorter—Underslung Springs Take Drive and Torque

with this, the driving compartment has been enlarged 2 inches in width and the same amount in length. This makes a very roomy seat, and the extra leg room should be appreciated, especially on long runs.

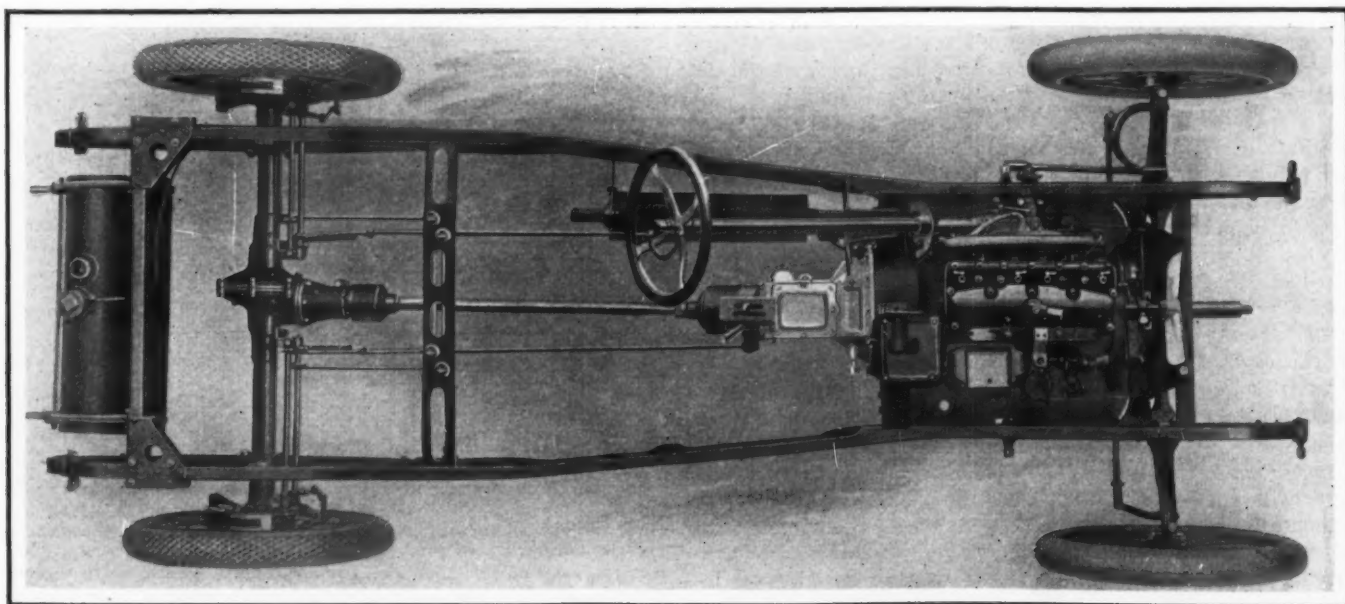
The Oakland four has a Northway unit power plant, the cylinder bore of which is 3 1-2 inches and the stroke 5 inches. The Delco electrical combination is continued, and the carbureter is an improved Marvel. The clutch is a cone, gear-set a compact three-speed design, and drive to the rear through a tubular shaft. Springs in the rear are three-quarter elliptic, the axle is floating, and the propulsion of the chassis on the Hotchkiss principle. The wheelbase remains 112 inches, and the car is shod with 33 by 4 tires on demountable rims, the rear pair being non-skids.

Power Plant More Compact

Nothing has been materially altered in the engine design. It is really so similar to that of last year that the casual observer would not see any difference. However, the whole power plant has been made more compact by reduction in the space occupied by the clutch, and this allows a shortening of about 2 inches overall. Instead of using one large spring at the center of the clutch mechanism to hold it in engagement with the female member, six small springs are employed for the purpose, these being arranged equidistant from one another. This permits each spring to be shorter than a single large spring would have to be and at the same time it should tend to a better action, since the engaging force is distributed.

Dashpot Type Carbureter Used

The type of Marvel carbureter now fitted employs a dashpot to prevent fluttering of the air valve. That is, the valve is connected to the dashpot in such a manner that its action is dampened. Any change in suction has to be of sufficient



Plan view of four-cylinder Oakland 38 chassis showing layout of power plant and simplicity of design. Note tapered frame

duration to make the valve open gradually, a feature preventing any jerkiness in the action of the engine at speed.

The motor is capable of running at moderately high speed, and may really be classed as a high-speed type in the generally accepted sense of the term. It attains a speed of 2,500 r.p.m. when developing 39.5 horsepower. This is a commendable output for an engine of its dimensions, and is said to be made possible principally through the use of large valves and special cam design, affording a good lift to the valves. They have a diameter of 1 5/8 inch, and are constructed of tungsten alloy steel.

The dimensions of 3 1/2 by 5 inches give a piston displacement of 192.4 cubic inches, and through the use of light reciprocating parts, there is no doubt that the engine develops its full quota of power. As last year, the manifolds are designed for least gas restriction, and the carburetor throttle valve is arranged parallel to the crankshaft so that there is no tendency for the throttle to act as a deflector and the distribution of fuel to each cylinder is equal.

Arrangement of Power Plant

In the general arrangement of the engine, the valves and manifolds are placed on the left, with the Delco unit on the right. The cylinder head is detachable as a unit, allowing access to cylinders and pistons. The water pump is located just forward of the electrical unit, and driven from the same shaft. The latter also carries the fan driving pulley, and is operated by gear connection with the crankshaft in the conventional manner. Suspension is at three points with integral crankcase arms at the rear, and a center support at the front. The oil reservoir is at the forward left side and a part of the lower half of the crankcase.

Pistons Are Crowned

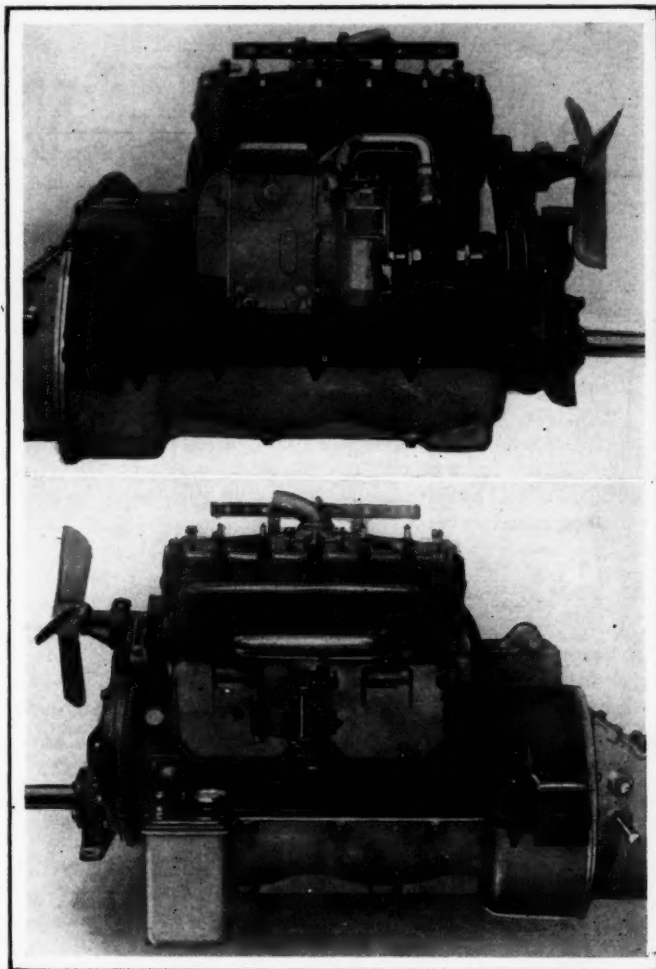
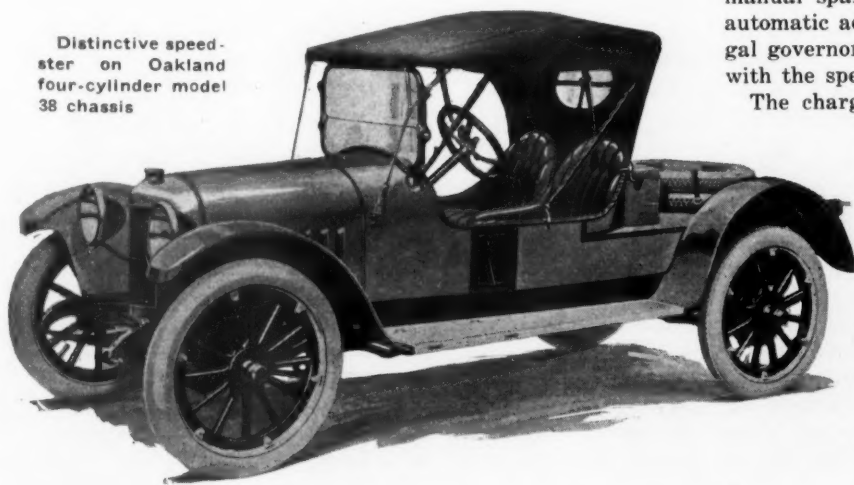
The pistons are crowned to make them as strong as possible without materially adding to their weight. They connect to the crankshaft through the conventional type of drop-forged connecting-rods. The crankshaft is a three-bearing type with the following bearing dimensions:

Front—1 5/8 by 3 3/8 inches.
Center—1 7/8 by 2 3/8 inches.
Rear—1 15/16 by 3 11/16 inches.
Connecting-rod lower bearings—1 5/8 by 2 1/4 inches.

These bearings are all of a special form of babbitt.

The Delco apparatus is the standard single-unit type manufactured by the Dayton concern, and incorporates the ignition distributor as an integral part of the main device. There is no alteration in its method of operation. When acting as a generator it is driven from the front gears by the shaft already mentioned, and when cranking the engine it drives the flywheel through a train of gears housed in an integral compartment on the right rear side of the flywheel.

Distinctive speedster on Oakland four-cylinder model 38 chassis



Both sides of Northway unit power plant used in four-cylinder Oakland model 38. By reducing the space occupied by the clutch the power plant has been shortened about 2 inches for 1916

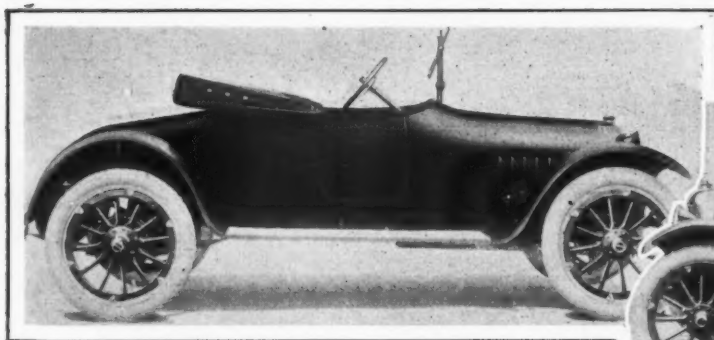
case. A small pedal to the right of the control pedals is used to push the gear train into mesh with the flywheel ring gear, and through this connection a reduction of about 25 to 1 is attained. That is, the engine is turned at a speed one twenty-fifth that of the starting motor. These starter gears are so arranged that both sets are shifted out of mesh when the starting function is not required, causing all of them to be at rest until needed.

The electrical system is of the single-wire type and operates at 6 volts. By this method the wiring is minimized, and the return circuit is grounded. The ignition part provides an automatic spark advance within range of the set point of the manual spark lever on the steering wheel quadrant. This automatic advance is attained through the use of a centrifugal governor which controls the spark position in accordance with the speed within the limits as just mentioned.

The charging rate of the generator is also automatically regulated. This takes care of charging at low speeds, so that, with ordinary car speeds of from 10 to 15 miles an hour the battery is being charged at about the same rate as it would have were the car running at high speed. A compartment under the front seat conveniently houses the 80-ampere-hour Exide storage battery. In placing it here, accessibility has not been overlooked.

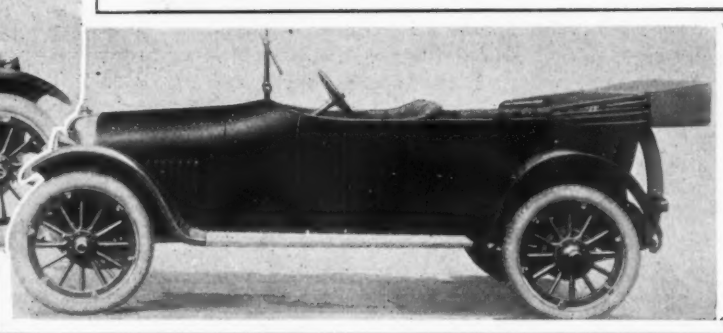
Gearset Is Unchanged

The gearset is still the compactly designed unit used on the previous model. Gears are of wide face and stub tooth form to give strength.



Above—Oakland four-cylinder model 38 chassis fitted with roadster body

Below—Five-passenger touring car mounted on the Oakland four-cylinder model 38 chassis



The shifting lever mounting and that of the emergency brake lever continue to be of the unique rocker type which requires no oiling, and is proof against rusting or binding. The brake operating system also uses these rocker bearings. Each lever and the brake rocker shaft get their oscillatory freedom through the compressibility of the springs which hold them to their positions. Small pressed-steel cups hold the springs in place, and these can be removed by turning them at right angles to their fastened position so that the larger pair of slots in their heads will clear the ends of the brake rod levers or the pins in the ends of the shifting or emergency brake levers, as the case may be.

Another clever part of these bearings is the provision for adjustment of the rod connecting the brake lever to the brake rocker shaft. The threaded end of the rod passes through the end of the lever, the front side of the part around the hole through it being grooved to receive the edge of a wedge-shaped piece screwed onto the rod end. A cotter pin prevents it from coming off, and the lever groove acts as a lock to prevent its turning. Thus the lever and its rod are free to oscillate sufficiently for all positions of each with respect to the other.

Hotchkiss Drive Employed

The Hotchkiss type of drive is retained. By that is meant that the drive and torque are taken through the rear springs instead of having any torsion arm or radius rods for the purpose. This makes for a light construction which is very satisfactory. The master leaves of the springs are of such size that they can take the shocks of the road with a cushioning effect, preventing them from reaching the general chassis mechanism.

The propeller shaft is tubular and fitted with two universal joints in the customary positions. The shaft has an outside diameter of 1 1/2 inches and an inner diameter of 1 1/4 inches. Such a shaft construction is much lighter than a solid type would be, and at the same time it is stronger against whipping.

The rear set of springs go under the axle, while the front pair remain above. This rear construction lowers the chassis considerably and is in part responsible for the general low lines of the car. The front springs are 35 1/4 inches long, while the rears are 48 inches.

The rear axle is of the type known as a one-bearing floating construction. That is, there is a single bearing directly in the center of each wheel to carry the load. These wheel bearings are Hyatts, as are those in the differential. New Departures are used in the pinion and as thrust carriers on either side of the Hyatts.

A commendable feature of the chassis is the tapered frame which follows the body line all along, affording good support throughout the body length and doing away with running board aprons, since the frame itself comes flush with the body and running boards. Some weight is also saved by the elimination of these aprons. This construction was new to

the Oakland four of last year, and is continued without change.

In connection with the body, a neat feature this year is the combining of the instrument board with the body. It is made of metal and is so tilted that a clear view of all instruments is possible when in the drive seat. The running boards are covered with linoleum this year, the previous model having metal boards. This was done to follow the popular trend.

To Feature Speedster

For this season Oakland is to make a feature of the attractive speedster type of body with its bucket seats and rakish appearance. The sides of the body are low and the afterdeck flat to carry a spare tire. Due to a higher gear ratio in the rear axle than the roadster and touring models have—3 3/4 to 1—this speedster is a fast car, and is said to readily attain a speed of 60 miles an hour.

The Stewart vacuum gasoline feed is employed as standard this year, drawing the fuel from a 15-gallon tank at the rear.

Driving this car reveals a very comfortable design, for ample room is afforded for getting in and out on the drive side, and for having the legs at a comfortable angle. The gearset lever is convenient to the right hand, while a neat aluminum gearshift gate indicates the position of each speed. In a demonstration run, THE AUTOMOBILE representative was surprised at the flexibility of the car and its quick get-away. Convenient location of the control apparatus was also noticeable, the horn button on top of the steering wheel being a typical feature.

Oldsmobile Eight Replaces Six

(Continued from page 939)

individual troughs under the cylinders and to the crankshaft and camshaft bearings.

Of course, now that the vacuum feed system is employed, the pressure air pump of last year is eliminated. The fuel is drawn to the vacuum tank instead of being forced to the carburetor, and from the tank flows by gravity to the carburetor. A gasoline gauge has been fitted to the tank this year.

Speedometer Drive Off Propeller Shaft

The speedometer drive has been changed so that it is now off the propeller shaft instead of the front wheel. The driving gear is mounted on the front of the forward universal, and a bracket attaching to the rear of the gearbox holds the flexible shaft gear.

The same general refinement of appointments and finish which featured the car of last season are to be found on the new model. The Circassian walnut instrument board, with its small compartments on either side, and the steering wheel of the same wood do their part to touch off the leather upholstery and general finish. A good feature is the mounting of the Delco switch on a hinged door in the dash.



PUBLISHED WEEKLY
Copyright 1915 by The Class Journal Co.

Vol. XXXII Thursday, May 27, 1915 No. 21

THE CLASS JOURNAL COMPANY

Horace M. Swetland, President
W. I. Ralph, Vice-President E. M. Corey, Treasurer

A. B. Swetland, Secretary
T. B. Van Alstyne, Advertising Manager

231-241 West 39th Street, New York City

EDITORIAL

David Beecroft, Directing Editor
Donald McLeod Lay A. Ludlow Clayden
J. Edward Schipper Sydney Oxberry
L. V. Spencer, Special Representative, Detroit

BRANCH OFFICES

Chicago—910 South Michigan Ave., Phone Harrison 7707
Detroit—95 Fort Street, West, Phone Main 1351
Cleveland—516-517 Swetland Bldg., Phone Prospect 167

Cable Address ----- Autoland, New York
Long Distance Telephone ----- 2046 Bryant, New York

SUBSCRIPTION RATES

United States and Mexico ----- One Year, \$3.00
Canada ----- One Year, 5.00
Foreign Countries ----- One Year, 6.00

To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order, or Register your letter.

Entered at New York, N. Y., as second-class matter.
Member of the Audit Bureau of Circulations.

The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

New Speed Factors

THIS YEAR'S 500 mile race gives promise of ushering in a new era in American speedway racing, first because of the smaller motors and second because of lighter-weight cars and the more general use of American-made cord racing tires. Cutting the motor displacement from 450 to 300 cubic inches has instead of reducing the speed of the machines resulted in higher speeds than a year ago. This is primarily due to larger valve openings obtained either by using four valves per cylinder or making valves larger in proportion to the cylinder bore. The use of lighter reciprocating parts has played its part in increasing the possible crankshaft speeds of these motors.

Speed has been added to the chassis by the general cutting out of weight, made possible by a better adaptation of material to the work to be done. There are better steels used in the 300-inch racing cars this year than used on the average last year. Some makers are saving weight by using lighter metals than cast iron, or cast steel where strength is not the first consideration.

By using cord tires with lower air pressures several entrants look to less chassis vibration and the possibility of going through the race with lighter car parts and yet with little if any danger of them giving way. As to the merits of such, Saturday's race should furnish valuable lessons.

New Racing Problems

FIVE YEARS ago when the subject of the higher efficiency of small motors in Europe was a dominating topic one of our engineers gave the sound advice that if we were handed such motors at that time it would be impossible to use them without first strengthening all of the other parts of the car because the added power of the new motors would mean improved design in many car parts, in fact, a general redesigning of many parts.

The truth of this contention is being well demonstrated in the preparation for the present race. Engineers who set out to get more power by doubling the number of valves and reducing the weight of reciprocating parts have succeeded, but while accomplishing this have run into new troubles of motor lubrication, new troubles of bearings for connecting rods, and new fits for pistons and piston rings. Getting increased power is one thing but taking care of all of the other parts of your motor to care for this added power is equally necessary. The 300-inch cars are giving not a few engineers excellent lessons in the necessity for balanced design, telling them in unmistakable terms that it is poor judgment to build up one part unless all others are brought up in like proportion.

Enter the Twelve

THAT THE twelve-cylinder automobile is now a manufactured article must not be regarded so much as marking a new stage in development as rounding out the situation created by the success of the eight. Engineers have long known the theoretical advantages of the even torque which eight or twelve alone can give, but there has always been the question, is it worth while?

In the case of the eight applying up to date high speed motor principles showed that it certainly was worth extra pistons and cylinders to get the qualities of performance that characterize the eight. Now comes the twelve to carry the multicylinder principle to its logical conclusion, that is a fresh impulse at each 60 degrees of crankshaft movement and the perfect balance of the small six.

The torque of the twelve is hardly perceptibly better than that of the eight, but the balance of the latter has an imperfection which is absent in the twelve so the latter is an advance—in theory. Of course we cannot determine yet how small a twelve will pay; as yet we do not know the low limit of size for an eight even, but it is probable that a couple of years' experience will see the matter settled along well-defined lines.

That the twelve has come to stay is as little to be doubted as is the fact that the four-cylinder motor will satisfy the demand of the majority of motorists for many years to come; like most other articles automobiles must contain qualities of performance in proportion to price, and this the twelve-cylinder car is practically certain to do just so long as the price is high enough to pay for a really high class mechanical job.

Stearns 5-Ton First Knight Truck

Four-Cylinder 4 1-4 by 5 1-2-Inch Motor—Chain Drive—144 or 180-Inch Wheelbase

CLEVELAND, O., May 25—Marking the first appearance of a commercial vehicle of its kind on the American market, the F. B. Stearns Co., this city, has brought out a 5-ton truck equipped with a Knight motor. It will be made in two standard chassis lengths, one with a 144-inch wheelbase selling at \$4,500, and the other a special long 180-inch wheelbase selling at \$4,800. Both are equipped with a four-cylinder 4 1-4 by 5 1-2-inch Knight motor driving through a gearset and side chains. Front tires are 34 by 5 single and rear tires 38 by 5 dual.

Locomotives Adopt Multiple Disk Clutch for 1916

NEW YORK CITY, May 24—The 1916 Locomotives have arrived at a number of the branches and show many refinements over the 1915 models. The principal change is in the clutch, which is a multiple disk design so constructed as to require practically no attention as regards lubrication and adjustment. It is a dry disk design with nine driving and eight driven disks. Between these there are eighteen disks faced with fabric, which are idle on the clutch shaft. The effect of these is to distribute the wear over a large surface area and to give a very easy engaging clutch. In addition to this refinement it will be noted that the cars have a longer, lower appearance due to an increase in the wheelbase, the straightening out of the body lines and the method of attaching the body to brackets on the frame instead of to the frame itself.

No Break in Body Lines

By increasing the slope of the bonnet the line of demarcation between the bonnet and the cowl has been entirely removed and the bonnet line moulds gradually into the side line of the body without any perceptible break. The instrument board has been laid out in a different manner, providing greater accessibility to the switches, thereby enabling the driver to operate them with his foot. The upholstery has also been improved and is equipped with differential springs, which gradually absorb the shock by having a stiff spring take up the effort where a weaker spring has reached its capacity. Other points for which the new models will be noted is in the increased use of drop forging for such parts as the distance rods, etc. The

result is to produce a lighter car, although more room has been gained by the longer wheelbase. The increased available space has been made use of to mount a seven-passenger body on the smaller of the two sixes manufactured, whereas last year only a five-passenger body was accommodated. The two chassis models will continue to be known as the 6-38 and 6-48, and the prices remain unchanged. The stock touring car on the smaller model as quoted for 1915 is \$4,400, and for the larger chassis, with touring body, \$5,100.

Pierce-Arrow to Concentrate on Sixes for 1916

BUFFALO, N. Y., May 20—A foreword of the 1916 policy of the Pierce-Arrow Motor Car Co. is contained in an announcement made by this concern in which it states that the Pierce company has at present no intention of building other than sixes and its announcement in December next for the year 1916 will contain nothing contrary to this policy. Series three Pierce-Arrow cars will be continued throughout the calendar year 1915.

S. O. Gasoline Price Raised 1 Cent

NEWARK, N. J., May 22—The Standard Oil Co. of New Jersey within the past week has advanced the price of gasoline delivered at garages from 9 cents to 10 cents a gallon. The Atlantic Refining Co. quotes 11 cents a gallon for gasoline delivered at garages.

The Standard Oil Co. of Indiana attributes the recent advances in gasoline prices in the East to the export demand. It states that this has strengthened the interior market also but not sufficient yet for a circular advance.

Leading independent dealers expect an advance in the Indiana territory soon. They say that the crude oil market is decidedly firmer. One producing company recently sold the Standard Oil Co. of Indiana 200,000 barrels at 40 cents a barrel, at the wells at Cushing, whereas previously the Indiana company had paid as low as 30 and 35 cents, although the market price was 40 cents.

Gasoline Substitute Called Charbo-Oil

HULL, QUE., May 20—A scientist in this city claims to have found a substitute for gasoline called charbo-oil. At a test before several officials of the public works department recently, two tablespoonfuls of the liquid, mixed with 2 quarts of water, proved sufficient to run a 2 3-4 horsepower engine 1 1-2 hours without stoppage. The discoverer, Gideon Charbonneau, asserts he will be able to manufacture the liquid in any quantity at 4 cents per gallon. The liquid does not give off any smoke.

Weed Wins in Patent Suit

Chicago Court Holds That E-Z On Chain Tire Protector Infringes Parsons Patent

CHICAGO, ILL., May 22—The E-Z On chain tire protector has been declared an infringement of the Parsons patent No. 723,299 owned by the Weed Chain Tire Grip Co., in a decision handed down by Judge Arthur L. Sanborn in the United States district court in this city. The E-Z On device was manufactured and sold under Frambach and Corrington patent No. 1,001,518 and under a pending application that has since developed into patent No. 1,096,101.

The suit was brought by the Weed Chain Tire Grip Co., against Edward D. Lewis, Thomas V. Garvin, Matthew J. Frambach, E-Z On Chain Tire Protector Co., and Hartley Manufacturing Co., and in March, 1913, Judge Carpenter granted a preliminary injunction after a hearing on a full showing by affidavits. The case has now had its final hearing.

In his decision Judge Sanborn states that the E-Z On chain tire protector made and sold by the defendant is a substantial reproduction of the Weed chain grips made by Weed under the Parsons patent. The sole defense according to the court, is non-infringement and the judge in his decision lays great stress on the fact that the E-Z On device would creep along the surface of the tire when fixed into position. Although affidavits were first made that there was no creep with the E-Z On grip, at the trial this position was decidedly modified and admissions were made that the device would creep to some extent.

Judge Sanborn held and cited previous decisions to the effect that the Parsons invention is not limited to any particular degree of looseness or any particular rate of travel, and that "Parsons' invention did not reside in creeping, which was old, but in his new mechanical structure by means of which creeping could be utilized, whereas in other or prior structures, creeping was undesirable." In another part of his decision the Judge said, "But even if defendants did in some way prevent the creeping of their device, they would still be utilizing the new construction patented by Parsons and would be getting many of the benefits made possible by his device." The decision called for the usual decree for an injunction and accounting.

Columbia Tire in New Plant

COLUMBIANA, O., May 22—The Columbia Tire & Rubber Co., of Columbiana, O., has taken possession of the new plant

which was built last year for the Columbia Rubber Co., but never operated. This plant was built especially for the manufacture of automobile tires.

The product of the new company will include Columbia tires and tubes. One of the tires will be known as the Gem No-Skid-Tread model.

The officers of the Columbia Tire & Rubber Co. are as follows: President, Chas. Hoffman; vice-president and general manager, W. G. Henne; and treasurer, W. F. Henne; secretary, J. E. La Dow.

Rice Is Waverley President

INDIANAPOLIS, IND., May 24—H. H. Rice, for several years vice-president and general manager of the Waverley Co., has become president, succeeding W. B. Cooley, who retires from active business. W. C. Johnson, for some years with the company, has been advanced to vice-president. Mr. Rice has been with the company since 1904 and since 1908 has been vice-president and manager.

Reo Lets Truck Export Contract

NEW YORK CITY, May 24—Gaston, Williams & Wigmore, export agents who have been responsible for a great deal of the business which has been done by American manufacturers with foreign belligerents, particularly Russia, have made an arrangement with the Reo Motor Truck Co., Lansing, Mich., whereby it will handle all of the export business of that concern in Reo motor trucks for both commercial and military use.

Forbes Is Monarch Vice-President and Sales Manager

DETROIT, MICH., May 24—T. C. P. Forbes, formerly of the Reo and Overland companies, has accepted the appointment as vice-president and sales manager of the Monarch Motor Car Co., this city. Mr. Forbes will be located in New York City, from which point he is planning the Monarch eight sales campaign.

Kelly Takes Over Chas. H. Fuller Toledo Business

TOLEDO, O., May 21—Martin V. Kelly, well known in the automobile industry, has taken over the business of the Toledo office of the Charles H. Fuller Co., of which he has been vice-president, and his new concern, to be known as the Martin V. Kelly Co., will start business June 1. The Kelly company is incorporated for \$200,000, its offices are in the Second National Bank Building, and its officers are: President, Martin V. Kelly; vice-president and treasurer, Ralph E. Kelly. The company takes all the advertising accounts formerly handled by the Toledo office of the Fuller company, including the Willys-Overland.

S. A. E. Summer Program Versatile

Professional Papers to Cover Wide Variety of Topics—Many Registrations

NEW YORK CITY, May 24—While the full program of the summer meeting of the Society has not been announced, and will not be until about June 1, it is known that about fifteen papers will be read and discussed at the professional sessions. The papers cover a wide range of subjects, the internal combustion engine being treated as not only applied to automobiles, but to farm tractors and aeroplanes as well. Other papers cover the subject of springs, wheels, tires, pistons, and spiral bevel gears. There will be a paper on the design and construction of motor-driven fire apparatus and another on the manufacture and use of lubricating oil. The war as referred to the automobile industry, will have a paper devoted to it covering the use of the motor truck; a method of scientifically testing vehicles will also be described.

As regards the social end of the meeting, plenty of time will be found in the intervals between the professional session. In order to gather the parties together, from the different sections, special trains will be operated from New York leaving this city at 5 p. m. on Sunday, June 13, arriving in Detroit, Monday morning. The general itinerary and program of the trip follows:

Leave Detroit, Monday, June 14, 2 P.M., S.S. Noronic.
Arrive Midland, Tuesday, June 15, 2 P.M., S.S. Noronic.
Through Thirty-Thousand Islands, Tuesday P.M., S.S. Waubic.
Arrive Parry Sound, Tuesday, June 15, 6 P.M., S.S. Waubic.
Picnic, Point Au Baril, Wednesday P.M.
Arrive Parry Sound, Wednesday, 6 P.M., S.S. Waubic.
Arrive Detroit, Thursday, 5 P.M., S.S. Noronic.
Professional sessions will be held Monday afternoon and evening, Tuesday morning and evening, Wednesday evening and Thursday morning. Section nights, when entertainment will be furnished by the local Sections, will be held Monday, Tuesday and Wednesday evenings after 10 o'clock.

Texas Jitney Convention June 14

SAN ANTONIO, TEXAS, May 25—William Haensler, of San Antonio, has called a State convention of jitney car owners and operators to be held in that city June 14 and 15. The program which has been prepared provides for a general discussion of the various phases of the jitney business and the appointment of committees at the morning session of the first day. At the afternoon session Ed. H. Wicks, an attorney of San Antonio, will deliver an address on "Legislation and its Relation to the Jitney Transportation." Other addresses will be made by L. M. Emlet of Kansas City, Mo., on "Insurance"; by Dr. G. P. Stoker of San

Antonio, on "Accidents"; by A. Burch of Austin, on "The Best Methods of Success," and by W. T. Farmer of Fort Worth, on "Our Duty in Protecting the Public and Ourselves." The second day's session will be devoted to considering the reports of the standing committees; the adoption of a constitution; the election of permanent officers, and the selection of a place and date for the next State convention.

Italy to Take Over Automobile Plants

LONDON, ENGLAND, May 20—Italian advices indicate that the government at Rome is prepared to take over all the private machinery shops in the Milan and Turin districts for the manufacture of war material. Many automobile shops having works at Milan, Turin and Genoa will be included in the list of works to be utilized for war munitions manufacturing, but for the present these plants will confine their efforts to turning out automobiles for the army.

British War Truck Order for Wichita Falls Motor Co.

WICHITA FALLS, TEXAS, May 25—The Wichita Falls Motor Co., Wichita Falls, is filling an order from the British Government for 300 motor trucks. A large number of the trucks have already been shipped via the port of Galveston.

Detroit S. A. E. in New Quarters

DETROIT, MICH., May 25—The Detroit Section of the Society of Automobile Engineers has moved into its new quarters 601 Kerr building, East Fort and Beaubien streets. The former location was in the Stevens building.

Up to May 15, a sum of \$1,850 had been pledged towards the expenditure fund for the year. The total for the year, or for 12 months, it is estimated, will be \$2,500. The following were the contributing concerns: American Auto Trimming Co.; Chalmers Motor Co.; Fisher Body Co.; Hudson Motor Car Co.; Hyatt Roller Bearing Co.; New Depature Mfg. Co.; Packard Motor Car Co.; Studebaker Corp., each \$200; Gould Storage Battery Co., and Holley Bros. Co., each \$100; Brush Engineering Assn., \$50. It has been provided that no single subscription may exceed \$500.

Will Build Falcon Truck

DETROIT, MICH., May 21—The Falcon Motor Truck Co. has been organized in this city to manufacture the Falcon 1,000-pound truck selling at \$750. The incorporators are: A. B. Mallow, of Detroit; F. B. Houston, of South Charleston, O., and A. B. Hazzard, of Detroit.

The Falcon will have a four-cylinder motor with 22 horsepower, cooled by the thermo-syphon system. The radiator is

set in a pressed steel shell. Ignition is Atwater Kent and automatic. A cone clutch is used. The carbureter has a final set adjustment and has a hot-air connection. Lubrication is constant level maintained with a positive action pump. This is connected with the dash where there is a sight feed. A selective gear-set is used with sliding gears and control is from the center and connected in the unit with the motor and with three speeds forward and reverse. The springs are semi-elliptic in front and full platform rear. Pressed steel wheels are 30 inches with 3 1-2 inch pneumatic tires. The steering is on the left hand. The wheelbase is 106 inches and the tread 56 inches.

Century Tire Plant Sold

NEW YORK CITY, May 25—The plant of the Century Tire & Rubber Co., Plainfield, N. J., which went into bankruptcy last March, has been bought by Leon Jaffess, of New York City, for \$29,000. The plant contains approximately 60,000 square feet of floorspace and has two floors.

Mr. Jaffess, who has a tire factory in Harrison, N. J., and who deals in tires in this city, will shortly announce a new stitchless tire which will be made at the Plainfield plant.

Xenia Rubber Buys Springfield Tire

XENIA, O., May 21—The Xenia Rubber Co., has taken over the stock equipment and business of the Springfield Tire & Rubber Co., Springfield, O., and will move it to Xenia, where a plant will be erected to house it. Machinery and equipment are valued at \$20,000. The Springfield company sold out because it was ordered out of its present building and was unable to secure a new location. L. M. Bickett is manager of the Xenia Rubber Co.

McCulla in Paris

NEW YORK CITY, May 25—William R. McCulla, assistant chief engineer of the Knox Motors Co., Springfield, Mass., who recently sailed for Europe, has established his Paris headquarters at the Hotel Edouard VII, at which point his friends will be able to reach him by letter.

Lozier Opens New York Branch

NEW YORK CITY, May 26—A branch salesroom has been opened in this city by the Lozier Motor Co., Detroit, Mich. It is located in the New Hearst building at the corner of Broadway and Sixty-first street. Joe Horan, who drove a Lozier car in races years ago has charge of Lozier sales in New York. The service station at Forty-seventh street and Eleventh avenue is to be continued.

A. C. A. Tests Transcontinental Stutz

Few Worn Parts After 3,728-Mile Grind—Averages 10.6 M. P. G. at 25.2 M. P. H.

NEW YORK CITY, May 25—Reports have been issued by the technical committee of the Automobile Club of America covering the test on the Stutz Bearcat which made the coast-to-coast trip in record time as reported in THE AUTOMOBILE for May 20. The certificate shows that the total elapsed time was 11 days, 7.25 hours. The total running time on the road was approximately 148 hours. The total distance covered as indicated by the odometer was 3,728.4 miles. The gasoline consumed amounted to 352 gallons and the oil to 34 quarts. From the data given in the affidavit the miles per hour during the total elapsed time were 13.8. The miles per hour in net running time were 25.2, miles per gallon of gasoline 10.6, and the miles per gallon of lubricating oil 440.

The Automobile Club of America, through its laboratory, made a careful examination of the car and found that the motor was in excellent running condition, except for the following: The wristpins were all slightly loose but still in good serviceable condition except for the one in piston No. 3 which showed the most wear and was sufficiently loose to cause a distinct knock when the motor was running. The side of No. 2 cylinder wall toward the front of the motor was worn at the bottom of the ring slide. The main bearings showed no sign of being loose but the large end connecting-rod bearings showed more end play than is desirable. All the cylinders, piston heads and valves were found to be carbonized. Covering the balance of the car, everything was found to be in good condition with the exception of wear in the wheel bearings, two leaves broken in the left front spring, left and right front shock absorber brackets broken, bearings on the countershaft worn and worn tires. The balance of the car was in uniformly good condition.

1,235 r.p.m. for 1 Hour

At the conclusion of the examination the motor was removed from the chassis and placed on the testing stand, where it was first run with open throttle for 5-minute intervals at several different speeds and afterwards continuously at a speed of 1,235 r.p.m. for 1 hour. During the latter time the average horsepower developed was 37.8 and the average fuel consumption 0.65 pound per brake horsepower hour. A complete record of the data obtained in these tests is given in the tables herewith.

No adjustments were made on the motor before the above mentioned test except that the carbureter was found to be out of adjustment and this was corrected. It was found that the motor did not run steadily at speeds below 800 r.p.m., indicating a leakage in the intake valve.

In a sworn statement filed with the club, Harry C. Stutz, president of the Stutz Motor Car Co., states that the car is known as Bearcat Model F, No. 2746 and is a stock model in all particulars except: 1—That the clearance allowed between pistons and cylinders was slightly more than in stock cars; 2—That the car was fitted with two sets of Hartford shock absorbers in the front and two sets in the rear, whereas only one set in the rear is stock; 3—That the fenders regularly supplied on stock cars were not carried; 4—That the rubber bumpers used under the front spring are not regularly furnished with stock cars; 5—That the electric starting and lighting equipment generally supplied is not carried.

The motor is a T-head design with spark-plug over both valves. The nominal bore and stroke is 4.75 by 5.5 inches. Ignition is supplied by a Bosch two-spark magneto and the carbureter is a Stromberg model H-3. Wheels are Houk.

TABLE 1
Horsepower
at different r.p.m.

R.P.M.	Torque	B.H.P.	Gasoline (lbs. per B.H.P. Hr.)
848	207.4	33.5	0.84
1052	209.5	42.0	0.71
1265	199.0	47.9	0.67
1472	178.5	50.0	0.65
1614	146.0	44.9	0.75

TABLE 2
B.H.P. during
continuous run of 1 hour

Time	R.P.M.	B.H.P.
5 Hr. 23 Min.	1236	48.2
34	1211	47.0
45	1231	47.9
56	1230	47.8
6 Hr. 07	1243	48.2
18	1246	47.8
23	1246	47.8

Average R.P.M., 1235.
Average B.H.P., 47.8.
Average gasoline, 0.65 lb. per B.H.P. hr.

Exposition a Mecca for Cars

LOS ANGELES, CAL., May 20—About thirty-one automobiles leave Los Angeles daily for the Panama-Pacific International Exposition at San Francisco. The San Francisco fair does not draw all the motor travel, by any means. It is estimated that there are thirty-six cars driven out of this city every day of the week for the Panama-California Exposition at San Diego.

Each car carries an average of four persons, and the total number of miles covered daily by the exposition tourists is estimated at approximately 21,000 by the experts of the touring department of the Automobile Club of Southern California. The present army of automobilists traveling between the two expositions is spending an average of \$1,340 per day.

Trade Developments in Detroit

More Twelves and Eights Coming—Why Not a Ten?—
Racing Gains Followers

By L. V. Spencer

DETROIT, MICH., May 25—If you had told people a year ago at this time that eight-cylinder and twelve-cylinder cars would be the latest thing in motoring circles a year hence, they probably would have advocated having your head examined. Yet it is even less than a year since eights were a thing unheard of in American factories. Now there are not only a score or more of makes of V eights, but there are likely to be several V twelves.

Naturally much interest centers in the new so-called Twin Six Packard, which is on view at the factory salesrooms of the company here. By lifting the veil from this new car, Packard steals a march on several other companies which are probably going to have them for the coming year. Indianapolis is not to be outdone, for National is already in line with such a motor, and it is understood that another Detroit concern is making haste to let the public know about its twelve.

It would seem that there is a place for twelves in the list of automobile types, but it is a development that was hardly looked for so soon. Sunbeam of England was the first to make such a multiplicity of cylinders for automobile engines, so America cannot claim to be original in the twelve movement. Like most other things, however, the adoption of twelves commercially has been left to this country.

It is quite a radical step for Packard to take—that of going over to the making of a twelve-cylinder car exclusively. It was hardly to be expected that the big plant would drop its sixes, but the move only illustrates the progressiveness of the maker of today.

Why Not Tens?

Now that we have concrete examples of what can be done with eights and twelves, when will some maker decide to steer an intermediate course and come out with a ten-cylinder car? Such a design is entirely feasible, and though it involves some nice engineering, it is not too much to predict that some motors of such a number of cylinders will be brought out before very long, judging from the way new types bob up these days.

Nor have we heard the last word on eights yet. Several other prominent

makers are going to announce them for 1916, and it is going to be a busy year for the engine manufacturers if present plans materialize. In not a few cases it seems to be the policy to abandon large sixes in favor of lighter eights. The production of fours and sixes was the rule with a number of makers last season, but next year the lines which the dealers demand are fours and eights, in a number of instances. There will undoubtedly always be a place for good sixes, but room must be made for the types with more cylinders.

In the old days nearly every maker entered the various automobile races and hill climbs. The idea was to advertise the particular make of car and it was a fine idea. It is today, but many of the factories have given it up for one reason or another. However, there seems to be a growing tendency in some quarters to get back into racing to keep their names before the public. The Detroit company and the Briscoe people are going to have racing cars to enter dirt track events this summer, and they may go into some of the other race meets. It is going to do a lot to keep both of these names in the limelight if the cars make good showings, and the concerns are to be congratulated for the policy.

Workmen in the Detroit car plants seem mightily pleased with the Eastern time that the city has just recently adopted. Now that it has been here long enough to allow the men to become accustomed to it, they appreciate the daylight that greets them on leaving their work at night. It seems to create a more cheerful feeling, and has no doubt been a good move.

Detroit Section Has Home

The Detroit Section of the S. A. E. is congratulating itself on the fact that it now has a permanent home with a paid assistant to the secretary.

To defray the expenses of the section under the new scheme, a budget of \$2,500 was decided upon, and to May 15 over half of the needed amount has been pledged. The idea is to have the pledges come from manufacturers in this city or vicinity or from other concerns having offices here. It was only about a month ago that the idea was first announced, and now \$1,850 is assured. In another month the section will have its welfare guaranteed for a year hence.

Many Detroiters are going to Indianapolis for the race, which as a meeting place for the engineers and factory men, is somewhat like the national shows.

Coffin Returns to Detroit

DETROIT, MICH., May 26—Howard Coffin, chief engineer of the Hudson Motor Car Co., has returned to this city after spending the winter on Sapeleo Island, off the coast of Georgia.

Hoover Steel Ball Doubles Plant

Machinery To Be Installed in
60 Days—Buyer of Crescent
Plant To Build Cars

DETROIT, MICH., May 26—*Special Telegram*—The Hoover Steel Ball Co., Ann Arbor, Mich., has completed an addition to its manufacturing plant which will double its present capacity and make it one of the largest manufacturers in this line in the world, it is claimed. Within 60 days it is hoped to have all of the new machinery installed in the addition.

Crescent Plant Sale Confirmed—To Reorganize and Build Cars

CINCINNATI, O., May 21—The sale of the plant, stock and equipment of the defunct Crescent Motor Co., Carthage, O., to Col. F. B. Enslow of Huntington, W. Va., has been confirmed by the court. The purchaser has paid the second and last installment of the purchase price. This installment was \$63,000 in bonds which he surrendered to the trustee, L. J. Huwe and \$4,000 in cash. Col. Enslow is taking steps for the reorganization of the company and expects to manufacture automobiles.

\$170,000 Bid for Detroit Body

DETROIT, MICH., May 22—At the sale of the property of the bankrupt Detroit Body Co., a bid of \$170,000 was made by the Fisher Body Co., and it is now subject to confirmation by the U. S. district court. The property consists of 2.85 acres of land, the buildings, machinery and equipment, also stocks of materials, the whole having been appraised at \$234,000.

Burd Gets Packard Contract

ROCKFORD, ILL., May 20—The Burd High Compression Ring Co., this city, has secured the contract from the Packard Motor Car Co., Detroit, Mich., to supply its entire 1916 requirements with the patented Burd high compression piston rings.

The increased business of the Burd company has necessitated doubling the floorspace and facilities of the factory more than twice within the last 6 months.

Hulett-Law to Handle Hudson

INDIANAPOLIS, IND., May 25—R. V. Law, assistant sales manager of the Pierce-Arrow Motor Car Co., Buffalo, N. Y., who has been with the company 7 years and J. B. Hulett, assistant sales manager Chandler Motor Car Co., Cleveland, O., formerly with the Pope interests, have formed the Hulett-Law Motor Car Co., this city. They will handle the Hudson as distributor for Indiana.

Export Bureau Established

To Foster Relations Between American and Foreign Organizations

NEW YORK CITY, May 24—THE AUTOMOBILE in cooperation with the trade and technical papers with which it is affiliated, has organized The United Export Bureau for supplying information and giving other aid to American manufacturers who are seeking export trade.

This action was taken, in part, because of the number of inquiries—and, in some cases, actual orders—which have come to our organization from distributors in foreign countries, more especially South and Central America.

This bureau, then, will act as an intermediary between foreign distributors and American producers, and also between foreign producers of raw materials and the manufacturing plants in this country by which such products are consumed.

The bureau will also assist American manufacturers in placing their advertising in newspapers and magazines published in Latin America. It will prepare photographs for United States concerns desiring to introduce their lines in Latin America, and will assist in the preparation of catalogues and other circular matter and the printing of them in Spanish, Portuguese or other languages. The bureau's accurate lists of merchants in the countries in question will enable us to duly take care of the mailing of such publicity.

The bureau will further aid in the introduction of U. S. A. products by supplying the press in South and Central America with illustrations which have been presented in THE AUTOMOBILE and in the other affiliated publications.

The charges for these various services and such other as may develop have not yet been fully determined. They will, however, be made as moderate as is compatible with the production of results.

The bureau is now in charge of a gentleman who has had wide experience in Latin America and is thoroughly familiar with the requirements of distributors and consumers there. Competent assistants have also been employed, and others will be added as the bureau's various activities require. Agents in the various countries of Latin America will also be appointed.

Chalmers Heads Detroit A. C.

DETROIT, MICH., May 22—At a banquet tendered by the charter members of the new Detroit Athletic Club to the officers and directors of the club, Hugh Chalmers, president of the Chalmers Motor

Co., and president of the club, was the principal speaker. He dwelt on the great industrial future of Detroit as typified by the growth of the automobile industry.

Among the officers and directors of the D. A. C. are some of the best known men in the automobile industry. In addition to President Chalmers, there are Henry B. Joy, president of the Packard Motor Car Co., who is first vice-president; R. D. Chapin, Hudson Motor Car Co.; H. M. Jewett, Paige-Detroit Motor Car Co.; John Kelsey, Kelsey Wheel Co.; W. E. Metzger; Eugene W. Lewis, Timken-Detroit Axle Co., all of whom are directors.

American Automobile Sales in Venezuela Growing

CARACAS, VENEZUELA, May 20—Sales of American automobiles in Venezuela have increased materially since the outbreak of the European war, despite unfavorable economic conditions due to prompt reduction of all Government salaries and the paucity of markets for exports. More than 90 per cent. of the automobiles imported come through the port of La Guaira. From July, 1914, to March, 1915, both inclusive, only four European cars were imported, as compared with 97 new American cars.

Dollar Exchange Initiated in S. A.

BUENOS AIRES, ARGENTINE, May 20—Actual headway has been made in Argentine and Chile in the introduction of the dollar exchange. The National City Bank, through its branch in Buenos Aires, has been successful in establishing the dollar in Argentina, and in Chile the American Smelting & Refining Co. has been instrumental in having the matter of quoting bills drawn in U. S. dollars considered by the Valparaiso Stock Exchange.

The subject has been largely discussed, and eventual world's pre-eminence of the American dollar, according to authorities, is not improbable, provided that there is essential co-operation between bankers, shippers, exporters and manufacturers.

To Classify Technical Literature

NEW YORK CITY, May 22—Delegates from about twenty national technical and scientific societies met in the Engineering Societies Building yesterday for the purpose of perfecting a permanent organization whose duty would be to prepare a classification of literature of applied science which might be generally accepted and adopted by technical organizations. The officers elected were: Chairman, Fred R. Low; secretary, W. P. Cutter; and members of the executive committee, Edgar Marburg; H. W. Peck, Samuel Sheldon. The Society of Automobile Engineers was represented by Coker F. Clarkson.

10,282 Studebakers in 8 Weeks

Production from March 20 to May 15 over 50 Per Cent. Ahead of Last Year

DETROIT, MICH., May 20—With all its plants working to full capacity and with so many orders coming in from dealers and distributors all over the country, the Studebaker Corp. anticipates that 1915 will be by far the biggest year in its history since the manufacturing of automobiles was started by it.

Production and sales have been 50 per cent. ahead of those of last year, thus far. Just to show how conditions are at the big plant the figures of what happened during a period of 8 weeks will tell the story.

Beginning with the first of the week ending March 27 and including the week ending May 15, there were made and shipped 10,282 Studebaker cars, as compared with 6,841 during the corresponding 8 weeks in 1914. This means an increase of 3,441 cars disposed of, or 50 per cent. more than last year. While the average production and sales were 855 cars per week during that period in 1914, the average increased to 1,285 this year, an increase of 430 cars per week, or over seventy more cars per day.

Following is the official record of production and sales:

Week Ending	1914	1915	Increase
March 27.....	805	1,275	470
April 3.....	931	1,168	237
April 10.....	1,092	1,063	61
April 17.....	956	1,208	252
April 24.....	625	1,409	784
May 1.....	819	1,518	699
May 8.....	808	1,415	607
May 15.....	895	1,226	331
Total	6,841	10,282	3,441

Pfeiffer, Miller Rubber Head, Delayed on Beached Ship

AKRON, O., May 20—Reports received from the West Indies contain the information that Jacob Pfeiffer, president of the Miller Rubber Co., this city, was on a ship that was beached off St. Kitt's Island. He notified his family in Columbus by cable that he would be home about a week later than scheduled because of the accident. He was a passenger on the steamer Byron.

Ohio Automobile Plants Doing Large Business

NEW YORK CITY, May 21—Reports from Ohio state that the commercial activity in the big cities there is at maximum capacity. At the present time the different automobile plants in Cleveland are working right up to schedule turning out cars, principally trucks, for European use. Large numbers of finished

cars can be seen at each factory, the result of working night and day.

The territory around Cleveland is also a virtual bee-hive, particularly Akron, where the large tire factories are located. Like the factories in Cleveland, the shops in Akron are also working at capacity both day and night.

All this activity has created a practically unanimous feeling of prosperity and optimism in Ohio, which has been given further impetus by the indications that the crops in that state will equal, if not surpass, those of last year. The locating of a Federal Reserve Bank in Cleveland has, of course, brought considerable money and prestige to the city. The presence of the bank has facilitated the furnishing of funds which the various lines of manufacture have needed.

Leece-Neville Buys Factory

CLEVELAND, O., May 22—The Leece-Neville Co., this city, manufacturer of electric starting and lighting systems, has purchased a two and three-story factory, located at 5353 to 5363 Hamilton avenue, N. E. The various departments, together with additional up-to-date machinery, will be gradually moved into the new plant without any interruption to the production of the company. The new building has a frontage of 150 feet, and is 312 feet deep, and the acquisition of this enlarged manufacturing space and additional machinery will give the company adequate facilities to take care of its rapidly growing business.

The new factory is located on the main line of the Pennsylvania Railroad, with switching service connecting all the other railroads entering Cleveland.

Richardson to Represent Studebaker in South America

NEW YORK CITY, May 20—To assist in developing the rapidly growing business of the Studebaker Corp. in South America, D. B. Richardson sailed from New York City the week of May 17 for Buenos Ayres. He will be located for some time in the capital of the Argentine Republic while giving attention to the work of the Studebaker organization in that territory. Mr. Richardson speaks Spanish fluently, and is in entire accord with the civilization of Spanish-America.

Trustee Named for McIntyre

SOUTH BEND, IND., May 24—At a meeting of the creditors of William H. McIntyre, head of the McIntyre automobile works, at Auburn, Ind., held in the office of S. A. Wood, Referee in Bankruptcy, Willis Rhoades, of Auburn, was named trustee. Judge Wood also appointed Hugh Culbertson, Mike Boland and W. C. McNabb to appraise the property of Mr. McIntyre. They will have nothing to do with the automobile works.

Cal. Registrations 131,123

More Cars in Southern Half— Northern Portion Leads in Sales and Is Gaining

SACRAMENTO, CAL., May 21—According to the figures issued by the cashier of the State motor vehicle department at Sacramento, Northern California is selling more cars than the southern portion of the state which previously boasted 55 per cent. of the car business.

California has two registration offices, one at the State Capitol at Sacramento, and a branch in Los Angeles. The latter office takes charge of the registration from Tulare county south, and the main office looks out for the remainder of the state.

Within the last 2 months the Sacramento office of the department has been collecting \$1,000 a day more than the Los Angeles office, and is now within \$33,000 of being even with Los Angeles in registration collections.

The total collections of the motor vehicle department to the closing hour of the first half of May were \$1,749,133.75, of which Los Angeles collected \$891,221.75 and Sacramento branch \$857,913.

The total number of automobile registrations is 131,123, or 6,000 more than the total at the close of the year 1914. They are divided as follows: Los Angeles, 67,525, and Sacramento, 63,598. It is believed that at the present rate the Sacramento division will pass the Los Angeles figures before July 1. Chauffeurs are divided as follows: Sacramento, 8,601, and Los Angeles, 5,975.

Van Speedometer for Chevrolet, Hupp and Jeffery

DETROIT, MICH., May 22—The Cutting, Armstrong & Smith Sales Co., Michigan representative for the Van Sicklen speedometer, has closed contracts with the Chevrolet Motor Co., Hupp Motor Car Co., and the Thos. B. Jeffery Co., for their 1916 equipment.

New York Dealers Win Test on License Tags

NEW YORK CITY, May 22—The right of automobile dealers to use manufacturers' number plates on their cars when the cars are being used for purposes incidental to the sale of cars, has been decided by the Court of Special Sessions in favor of the Automobile Dealers' Assn., which undertook the defence of T. P. Patterson, a chauffeur employed by the A. Elliott Ranney Co., who was arrested for driving a car bearing a manufacturer's number.

The association attorney, Charles Thaddeus Terry, defended the case in court, and contended that the law permits any dealer in motor vehicles to make use of the manufacturer's number plates on any of his cars when the car is in use for any purpose connected with the business of manufacturing or selling, including demonstrating, the operation of the cars on the streets for advertising purposes and the use of the cars by salesmen and managers in connection with business trips around the city or elsewhere. On consideration of Terry's contention the court acquitted Patterson.

To Use New Alloy for Spark Plugs

SOUTH BEND, IND., May 24—Dr. F. R. Carson, of this city, is interested in a company which will put a new spark plug, different from all others and for which strong claims are made, on the market in a short time. The new plug will be manufactured in Laporte, Ind. A new alloy, the discovery of H. M. Fetter, of Laporte, is the feature of the new plug, and it is said gives the new plug advantages possessed by plugs of no other make. The alloy resembles platinum and possesses many advantages of that metal at a very much lower cost. The points of the plug are made of this alloy and are in the form of half-spheres with the convex sides together, which, it is claimed, gives a larger and more intense spark, and tends to prevent the collection of oil and consequent carbonization.

English Financier Visits Plants

NEW YORK CITY, May 20—A. M. Sayer, Birmingham, Coventry, England, well-known English capitalist and probably one of the largest individual stockholders in the English automobile industry, is now making a 2 weeks' tour visiting all the American automobile factories. Mr. Sayer predicts a large market for American products on the continent.

Indiana Registrations Over 75,000

INDIANAPOLIS, IND., May 22—Previous records for issuing automobile licenses are being broken in Indiana. Thus far the Secretary of State has issued more than 75,000 licenses for 1915, and it is believed the total number for the year will be in excess of 75,000. There were 66,500 licenses issued during 1914.

National Used Car Market Report

CHICAGO, ILL., May 20—The Chicago Automobile Trade Assn. has, for the past year, been publishing the Used Car Central Market Report. This has been supplanted by the National Used Car Market Report. The title has been changed because of the report having become National in its scope.

Field for Taxicabs in Argentine

United Export Bureau Points Out That Promising Field—Cars Should Be Light

NEW YORK CITY, May 24—According to statements of the United Export Bureau about one-third of the automobiles in Buenos Aires are taxicabs. The street roads in that city are in splendid condition, but the suburban roads are bad and require very strong cars. The taxicab business in Buenos Aires, however, is good, as everyone travels in them. On Sunday it is not an uncommon sight to see working men and their families going about in automobiles.

The taxi rates are not high, it costing about 72 cents for the first mile and about 32 cents for each succeeding mile. The seven-seated touring cars are preferred to the taxicab. It is the belief of the United Export Bureau that there is now a very good opportunity for the American manufacturer to begin at once and send his representatives. In order to succeed the American manufacturer must be content with the same profit he makes here and it is very essential to have large showrooms centrally situated. A stock of several machines is advisable as when the Latin American decides to buy he wants the goods at once; orders are rarely given. Furthermore, it is indispensable that the representatives speak Spanish fluently.

The fact that American manufacturers have unsuccessfully attempted to introduce their products on several former occasions should not be discouraging, because if the matter is taken up correctly and not with a view of making an exorbitant, quick profit, success should result. The importation of European cars has come to a standstill and there is now a good opening for the American machine in the Argentines. The cars must be light, have high wheels and large tires. The cars which would be expected to sell best would be priced at from \$1,000 to \$1,400.

U. S. L. Plan Well Received

NEW YORK CITY, May 22—The reorganization plan for the United States Light & Heating Co. is meeting with favorable response. It is expected that the new company will have bought all assets of the old concern and should be in full operation by July 1. Opportunity for participation by stockholders in the reorganized company, which will carry the same name as the present one, but will be incorporated in New York instead of Maine, has been extended to June 1.

Preferred stock is now quoted, with none offered, at 28 bid, assessment paid. The issue of \$2,500,000 preferred stock by the new company was underwritten without commission, but practically all holders of the preferred stock of the present company, totaling \$2,500,000, have paid the \$15 assessment on \$100 par. This entitles them to an amount of new preferred corresponding to their present holdings. In connection with their assessment, common stockholders are being allotted \$5 in new preferred and \$20 in common for each \$100 par turned in.

Optimism at McCord Plant

DETROIT, MICH., May 22—With day and night shifts working for the last 3 months, and a total number of nearly 750 men on its pay roll, the McCord Mfg. Co., maker of automobile radiators, gaskets, stampings and other automobile parts, is hardly able to cope with its rushing business.

The first quarter of 1915 did not show a decided increase over the corresponding period in 1914, but ever since April there has been a steady and big increase in business, and indications are that the next 6 or 8 months will show a volume far in excess of any previous year's business in the history of the concern.

Manufacturers, who heretofore never placed big orders far ahead and who seldom gave specifications for over 1 or 2 months' output, have this year given all such information for many months to come, which is a condition never before experienced in the industry.

Pullman Ships 150 Cars a Week

YORK, PA., May 22—Operations at the plant of the Pullman Motor Car Co., since the reorganization of the company several weeks ago, have been increased considerably. A number of changes were made at the plant. The office quarters have been enlarged and the capacity of the body department has been increased. Night work is being done in a number of the departments. On an average of 150 cars are shipped from the factory every week. A shipment of Pullman cars was made this week to the company's representative in London, England.

101 Case Cars for Russia

SEATTLE, WASH., May 20—The Japanese steamer Kagoshima Maru sailed from Seattle during the past week with a cargo valued at \$975,000 and consisting of eighty cases of war automobiles manufactured by the J. I. Case Threshing Machine Co. The total consignment of automobiles was 101 and will be landed at Vladivostok for the use of the Russian army.

Increase of 43% for Sheldon Worm

From Sept. to Date Gain Was 42 Per Cent.—Increasing Equipment

WILKESBARRE, PA., May 24—Reports from the Sheldon Axle & Spring Co. covering the fiscal year ending September, 1914, show an increase in the business of the worm gear axle department of 43 per cent. over the preceding year which in turn was 23.5 per cent. higher than the year 1912. From September, 1914, to date an increase of 42 per cent. over the corresponding period of 1914 has been shown. In order to meet the increasing demands added space and equipment have been gradually added and during the past week two 92-inch grinders have been received as well as two additional oil fires in the drop forging department. Within the next 30 days a considerable run of floorspace will be added to the worm gear department to take care of the enlarged line. Announcement also was made at the factory during the past week that the 5-ton capacity worm gear axle will be ready for delivery early in June.

Maxwell's Daily Output Averages 250—Payroll Numbers 6,391

DETROIT, MICH., May 22—During the last 4 months the Maxwell Motor Co. has averaged an output of 250 cars a day, as compared with a daily average of 100 cars during the corresponding period in 1914. From January to end of April 2,268 men were added to the company's payroll, totaling 6,391.

Will Make Top Bows and Sockets

PONTIAC, MICH., May 20—The American Forging & Socket Co. has been organized to make bows and sockets for top makers. The plant formerly occupied by the Hardwood Electric Co., has been secured as the home for the new concern, which will be incorporated, and will have a capital stock of \$100,000. Those connected with the company are H. W. Wiley, president; E. W. Rathbun, treasurer; E. P. Heaton, secretary; Warren W. Stoler, consulting engineer, and E. J. Stoler, superintendent.

Favary Tire Incorporates in Canada

TORONTO, ONT., May 22—The Favary Tire Co., Ltd., has been incorporated. The head office of the company is in Toronto. The capital stock is \$500,000, divided into 50,000 shares of \$10 each.

The company has an agreement with the Favary & Cushing Co., of New York,

to purchase the Canadian patent granted in December, 1909, for cushioning devices and will pay therefor \$50,000 in cash, and \$250,000 par value of fully paid stock.

Directors of the company are: Walter Page, H. C. Appleton, R. P. Powell, James Crang, A. S. Hamilton, C. H. Rooke and A. W. Hunter, all of Toronto.

N. Y. Automobile Trade Assn. Re-elects Officers

NEW YORK CITY, May 20—At a meeting of the directors of the Automobile Trade Assn. of New York State yesterday in this city, R. H. Johnston, of the New York Automobile Dealers' Assn., was re-elected president; C. D. Hakes, of the Albany Automobile Dealers' Assn., was re-elected vice-president; R. E. Brown, of the Buffalo Automobile Dealers' Assn., was re-elected treasurer, and C. A. Stewart, of the New York Assn., was re-elected secretary and general manager. All the elections were unanimous.

Golden, Belknap & Swartz Show 15 Per Cent. Increase

DETROIT, MICH., May 20—From January to April the business of Golden, Belknap & Swartz, manufacturers of light car motors, shows 150 per cent. increase over the first 4 months of 1914. May, thus far, shows the same condition, and it is worrying the officials as the plant is being run to its full capacity, and they are behind in deliveries.

There are about 125 men in the shops now and the output has been thirty-five, or more, motors a day, or twice as many as last year.

It is not improbable that either a new plant or the considerable enlargement of the present one will have to be decided upon shortly to meet this increasing business, said an official of the company.

New Anderson Electric at \$2,450

DETROIT, MICH., May 26—*Special Telegram*—The Anderson Electric Car Co., this city, has brought out a new \$2,450 electric passenger model known as Model 55 Special, which is a development of the present Model 50 brougham. The new model has glass windows in the rear quarter panels which were formerly of solid aluminum. This gives a better vision. The new model has new Perfection lifts for the door windows.

Arndts Joins Western Spring & Axle Co. as Metallurgical Engineer

DETROIT, MICH., May 24—E. C. Arndts, of the Cleveland-Canton Spring Co., Canton, O., has been appointed engineer of the metallurgical department of the Western Spring & Axle Co., which has just moved into new quarters in the

Garfield building, Woodward avenue. This latter company is in reality the representative here for the following concerns: Cleveland-Canton Spring Co., Canton, O.; Ansted Spring & Axle Co., Connersville, Ind.; Cincinnati & Hammond Spring Co., Cincinnati, O.; Hess-Pontiac Spring & Axle Co., Pontiac, Mich.; Hess Spring & Axle Co., Carthage, O.; J. B. Armstrong Mfg. Co., Flint, Mich.; Spears Axle Co., Wheeling, W. Va., and the Champ Spring Co., St. Louis, Mo.

G. H. Russel Passes Away

DETROIT, MICH., May 18—George H. Russel, one of Detroit's most prominent business men, died yesterday. He was founder of the Russel Wheel & Foundry Co., and secretary-treasurer of the Russel Motor Axle Co.

Vincent, of Remy, Dies

CHICAGO, ILL., May 20—E. R. Vincent, manager of the Chicago branch of the Remy Electric Co., died suddenly at his home at 4033 Drexel boulevard, Chicago, May 14. Mr. Vincent had many friends in the automobile and accessory industries.

Washington's New Law in Force June 10

SEATTLE, WASH., May 21—Washington's new motor vehicle code goes into effect Thursday, June 10, supplanting the legislation of 1905 which has been amended from time to time to meet changed conditions in the industry. The new code is entirely different from its predecessor. It is thoroughly up to date and among its new provisions are those covering jitney bus lines, joy-riding and weight limits on vehicles that may traverse public thoroughfares.

According to the new law the cars will be licensed by county auditors instead of by the secretary of state and a graduated tax on horsepower will be used. Jitney bus drivers are required to take out \$2,500 surety bonds and the heaviest vehicle allowed on public highways is limited to 2,400 pounds. The law also specifically states that upon the sale of a car the vender must remove the license number.

Michigan Garagemen Organize

DETROIT, MICH., May 22—The garagemen of the state have formed an association known as the Garage Owners' Assn. of Michigan. The organization plans to work for the promotion of good roads and also plans activity in insurance, banking and co-operative purchasing. The initiative in the work of promoting the association was taken by the Detroit

Garage & Station Operative Assn., of which F. A. Bean is president. The association will be affiliated with the national organization.

Tripp Is Singleton Vice-President

CLEVELAND, O., May 20—W. H. Tripp, well-known in the automobile industry, has been elected vice-president of the J. F. Singleton Co., Cleveland, O.

Brazilian Rubber Duty in Abeyance

WASHINGTON, D. C., May 24—Owing to the impracticability of enforcing the Brazilian budget law for 1915 as regards the increased import duty on rubber goods, it has been decided to hold in abeyance these provisions. It is stated that the matter will again be submitted to the Brazilian Congress which is now in session and pending further action. The former rates of duty will apply on rubber tires and insulated wire. The concession will be made only upon condition that the importer obligates himself to pay the difference in duty in case the provision is not repealed.

Monitor to Continue Eight

COLUMBUS, O., May 22—The Cummins Auto Sales Co., formerly Krit dealer in this city, will not drop the production of its Monitor eight-cylinder model, as was stated in THE AUTOMOBILE for April 29. It is the intention to continue this model as well as the smaller four-cylinder model, which will sell for \$795, with complete equipment, including electric lighting and starting.

Insurance Cos. Responsible for Safety of Policies

ST. LOUIS, Mo., May 14—The ruling that automobile insurance companies are responsible for the safety of their policies was upheld by Circuit Judge Cave here a few days ago when he quashed the indictments against two men who had been charged with attempting to obtain money by false pretense from the Maryland Motor Car Insurance Co.

The indictments charged that the defendants had placed a valuation of \$2,750 on an automobile which in reality was worth only \$1,000 and that they had represented that it was a 1913 model when the machine was a 1911 model. The suit grew out of the automobile owners' attempt to collect damages from the insurance company after the machine in question had been destroyed by fire.

In announcing his decision Judge Cave ruled that even if the charges in the indictment had been proved they would not constitute a legal offense, as other courts had held that it was the duty of the insurance company to safeguard its own policy.

New Pathfinder Automobile Co.

Concern Reorganized with Capital of \$250,000—Lower Prices—Output 1,000

INDIANAPOLIS, IND., May 24—With an authorized capitalization of \$250,000, the Motor Car Mfg. Co. has been reorganized under the name of the Pathfinder Automobile Co. Articles of incorporation for the new concern were filed with the Indiana secretary of state last Friday and a charter has been granted.

In the reorganization the company has been strengthened. C. W. Richards and Leo Raminsky have bought stock in the company and these men and G. I. Lufkin, California agent for the Pathfinder, are named as the incorporators.

A cut in price and an increased manufacturing schedule are planned for this season. Officials of the company state that it intends to produce from 1,000 to 1,500 cars during 1915. This has necessitated an increase in the working force.

It is announced that the officers of the new company will be the same as those of the old concern, except that George Drawe has become sales manager. Mr. Drawe is well known in automobile circles.

A new name has been taken for the company in order that it may be more indicative of the business. Plans are under way for increasing the output and the present season promises to be the most successful that the company has ever had.

New Caterpillar Truck

MILWAUKEE, WIS., May 21—Applying the caterpillar traction device to a motor truck for the first time commercially, the Allis-Chalmers Co. has taken the first step towards its active entry into the motor truck field. The new vehicle is not intended for city work, of course, but rather for the service of road build-

ers, contractors, for farmers, lumbermen, and others who have to do heavy hauling over poor roads or no roads. The vehicle consists of a substantially standard motor truck chassis whose front wheels are of the farm implement type with ribbed steel tires and the rear wheels displaced by caterpillars. These comprise nests of wheels and rollers inclosed in continuous flexible belts built up of links with sectional steel treads. On the inside is a track upon which the wheels run. A sprocket at the rear end drives the flexible belts or caterpillars. The gearbox affords four speeds forward, giving speeds of from 1 1-2 to 10 miles per hour, and a draw-bar pull varying from 2,370 pounds to 9,000 pounds. The truck carries a body for 5 tons.

Market Prices Steady

NEW YORK CITY, May 25—Changes this week in market prices were for the most part in metals. The majority of the other products remained unchanged. The oils and lubricants were steady with a moderate demand and activity. Crude rubber was steady with a light demand from the manufacturers.

The metal changes this week were of the usual type. Aluminum, which went up to 22 cents on Thursday and held at that price to the closing on Monday, was firm; its gain was 2 1-4 cents. Copper showed no improvement in demand. Producing interests are still asking 18 1-2 cents a pound for electrolytic. The domestic situation is without improvement and temporarily all foreign orders for manufactured products have been covered. Lake copper showed improvement in tone, closing at 18 1-2. A weaker tone developed in the tin market. There was a general disposition to hold off from purchasing by both consumers and dealers. Tin went down \$1 per 100 pounds.

The rubber market has passed through a dull and uneventful week. Offerings were light. Few manufacturers seem disposed to purchase beyond their current needs.

Reo Co. To Enlarge Factory

More Room for Men—Two Three-Story Additions and Several Improvements

LANSING, MICH., May 21—Enlargement of the Reo Motor Car Co. has been decided upon and the new buildings are to be ready in September. One three-story building, 100 by 250 feet, will be erected on the south side of the plant. Its first floor will be an assembling room for chassis, the second floor will be the chassis painting department and the third floor will be the trimming department.

A three-story addition, 50 by 50, to the engineering building, will provide additional floorspace for the testing laboratory and drafting rooms, a pattern vault, a body designing department and a photograph gallery.

Two stories will be added to the receiving room and conveyors will be installed to carry stock from one floor to another.

New loading and unloading docks connecting with a receiving room and a warehouse for incoming materials will also be put up.

According to general manager R. H. Scott, these additions are not being made to increase the production materially but to give more room to the men and thus render working conditions more agreeable.

The big warehouse which was erected at a cost of \$250,000 last year and which has room for 2,000 cars will probably also be transformed or changed to suit for manufacturing purposes. This building was put up to store cars but the Reo company says that not a single car has yet been stored in it, or in any other building, as the production has never been up to the demand this season.

Jobbers Form National Association

CHICAGO, ILL., May 21—The National Assn. of Automobile Accessory Jobbers was formed in this city recently to serve as a national organization for the general improvement of the accessory jobbing business. Twenty jobbers, representative of the industry, and coming from different parts of the country, met at the Union League Club in this city for the purpose of organization and the general discussion of a program of activities. After the adoption of the constitution and by-laws, and the election of officers, subjects pertinent to the accessory jobbing business were discussed. Price maintenance was one of the pertinent topics handled, and it was the consensus of opinion that it is advisable to keep accessory prices to the consumer constant, regardless of the purchasing

Daily Market Reports for the Past Week

Material	Tues.	Wed.	Thurs.	Fri.	Sat.	Mon.	Week's Changes
Aluminum	.19 1/4	.21 1/2	.21 1/2	.22	.22	.22	+ .02 1/4
Antimony	.34	.34 1/2	.34 1/2	.34	.34	.35	+ .01
Beams & Channels, 100 lbs.	1.31	1.31	1.31	1.31	1.31	1.31	.....
Bessemer Steel, ton	19.00	19.00	19.00	19.00	19.00	19.00	.....
Copper, Elec., lb.	.18 3/4	.18 5/8	.18 1/2	.18 1/2	.18 1/2	.18 1/2	— .00 1/4
Copper, Lake, lb.	.18 1/4	.18 1/2	.18 1/2	.18 1/2	.18 1/2	.18 1/2	+ .00 1/4
Cottonseed Oil, bbl.	6.25	6.28	6.35	6.36	6.38	6.35	+ .10
Cyanide Potash, lb.	.24	.24	.24	.24	.24	.24	.....
Fish Oil, Menhaden, Brown	.41	.41	.41	.41	.41	.41	.....
Gasoline, Auto, bbl.	.12	.12	.12	.12	.12	.12	.....
Lard Oil, prime	.90	.90	.90	.90	.90	.90	.....
Lead, 100 lb.	4.20	4.20	4.20	4.20	4.20	4.20	.....
Linseed Oil	.67	.67	.67	.67	.67	.67	.....
Open-Hearth Steel, ton	19.00	19.00	19.00	19.00	19.00	19.00	.....
Petroleum, bbl., Kans., crude	.40	.40	.40	.40	.40	.40	.....
Petroleum, bbl., Pa., crude	1.35	1.35	1.35	1.35	1.35	1.35	.....
Rapeseed Oil, refined	.82	.82	.82	.82	.82	.82	.....
Rubber, Fine Up-River, Para.	.61	.60	.60	.61	.61	.60	— .01
Silk, raw, Ital.	..	..	3.90	..	..	3.90	.....
Silk, raw, Japan	..	..	3.55	..	..	3.50	— .05
Sulphuric Acid, 60 Baume.	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	38.50	37.50	37.75	37.88	37.88	37.50	— 1.00
Tire Scrap	.05	.05	.05	.05	.04 1/2	.05	.....

source. The new organization will make it one of its works to promote the interest of the legitimate accessory jobber by the proper handling of accounts, and putting the business in its proper field. The organization also has for its object the removal of many evils with which the business is constantly confronted. The adjustment of slow and bad accounts is one of these abuses. The organization will aim to harmonize the various factors in the trade, thereby promoting the general welfare of its members.

The officers elected were: President, T. M. Brooks, The Automobile Supply Co., Chicago; vice-president, S. P. Dean, Nichols, Dean & Gregg, St. Paul, Minn.; chairman Board of Directors, Chas. E. Faeth, Motor & Mechanics Supply Co., Kansas City, Mo.; and four directors: W. L. Ferrier, Fred Campbell & Co., St. Louis, Mo.; H. P. Andrae, Andrae & Sons Co., Milwaukee, Wis.; A. R. Thompson, Automobile Supply Co., Detroit, Mich., and W. W. Low, Electric Appliance Co., Chicago, Ill. W. M. Webster, 139 North Clark street, Chicago, is secretary.

It is the general feeling among several of the officers that the garageman should handle accessories and that in order to carry this out successfully he must look after his business in a business-like manner, otherwise this field of business will sooner or later be absorbed by mail order houses.

17,200 Licenses Out in Oregon

SALEM, Ore., May 8.—Over 17,200 licenses have so far this year been issued in the state of Oregon, as compared with only 16,347 for the entire 12 months of 1914.

Securities Firmer in Tone

Prices Higher Despite War Developments—Italy's Action Favorable

NEW YORK CITY, May 22—Automobile security prices, despite the entrance of Italy into the European war and the keen interest in the forthcoming reply of the German Government to the American note, were higher last week. The Italian move seems as a rule to be interpreted as a favoring influence for the general market. Quotations throughout the week were for the most part steady, showing a firm undertone.

Changes this week ranged from gains of 1-4 to 7 points and losses from 1 to 19 points. Most of the changes were gains. Tire issues showed a declining tendency; Goodyear common dropped 19 points; Kelly-Springfield common went down 7 points, its first preferred 2 points and its second preferred, 15 points. Both the common and the preferred of the United States Rubber went up 1 and 1-4 points respectively. Goodrich common and preferred went up 4 and 3-4 points.

Most of the automobile securities showed small changes. J. I. Case preferred went down 4 points; General Motors common went up 7 points; Maxwell stocks all went up, the common 3 points, first preferred 3 1-2 points, and the second preferred 4 points; both Reo issues rose, the truck 1-2 point, and the passenger car, 1 7-8 points; Stewart-Warner common rose 4 points; Studebaker com-

mon went up 4 points; Texas stock went up 2 points, while Vacuum oil rose 1 point. Willys-Overland common showed a gain of 2 points.

A strong tone developed in the Detroit securities, most of the issues showing gains. The largest gain was that of the Canadian Ford in inactive stocks, which was 200 points. In the active stocks the gains ranged from 1 to 9 points.

Lack of Uniformity in Texas Gasoline Prices

AUSTIN, TEX., May 22—The lack of anything like uniformity in gasoline prices in Texas and Oklahoma may bring about a joint investigation of the refined oil trade of the two States by their Attorneys-General departments. It is alleged that the refining companies arbitrarily fix the prices of gasoline without regard to the conditions surrounding the industry. It is pointed out in support of this contention that the fuel may be selling for 10 or 12 cents per gallon in Austin, Tex., and on the same day the price is perhaps 14 to 16 cents per gallon in some other town of the State which takes the same freight rate. Recently citizens of Poteau, Okla., filed complaint before the Corporation Commission of that State against the Pierce Oil Corp., the Gay Oil Co., the Texas Co., and the Magnolia Petroleum Co., alleging that the price charged in that town for gasoline is excessive as compared with many other places in Oklahoma. The complainants point out that the retail price of gasoline is 16 cents per gallon. The case was set for hearing June 8.

Automobile Securities Quotations on New York and Detroit Exchanges

	1914		1915		Wk's
	Bid	Asked	Bid	Asked	Ch'ges
Ajax-Grieb Rubber Co. com.	215	..	300	110	..
Ajax-Grieb Rubber Co. pfd.	99	..	101	110	..
Aluminum Castings pfd.	98	100	98	100	..
J. I. Case pfd.	84	87	76	82	—4
Chalmers Motor Co. com.	92	95	90	93	—1
Chalmers Motor Co. pfd.	90	92½	95	98	..
Electric Storage Battery Co.	52	53	..	..	..
Firestone Tire & Rubber Co. com.	302	307	..	485	..
Firestone Tire & Rubber Co. pfd.	108	110	110	112½	..
General Motors Co. com.	83½	85	135	137	+7
General Motors Co. pfd.	93	93½	97	100	..
B. F. Goodrich Co. com.	25½	25¾	44	45	+4
B. F. Goodrich Co. pfd.	89	90	101¾	102½	+ ¾
Goodyear Tire & Rubber Co. com.	177	182	225	235	—19
Goodyear Tire & Rubber Co. pfd.	98	100	105	106½	..
Gray & Davis, Inc., pfd.	95	102½	..	..	..
International Motor Co. com.	..	5	12	14	—½
International Motor Co. pfd.	3	10	30	33	..
Kelly-Springfield Tire Co. com.	..	..	124	128	—7
Kelly-Springfield Tire Co. 1st pfd.	..	..	81	83	—2
Kelly-Springfield Tire Co. 2d pfd.	..	..	115	130	—15
Maxwell Motor Co. com.	11½	12	39	41	+3
Maxwell Motor Co. 1st pfd.	18½	19	82	83	+3½
Maxwell Motor Co. 2d pfd.	44½	45	34	36	+4
Miller Rubber Co. com.	..	..	180	188	..
Miller Rubber Co. pfd.	..	..	104	105	..
New Departure Mfg. Co. com.	122½	124	136	141	..
New Departure Mfg. Co. pfd.	105	107	106	..	..
Packard Motor Car Co. com.	103	..	104	..	..
Packard Motor Car Co. pfd.	97½	..	98	..	—1½
Peerless Motor Car Co. com.	18	25	..	..	..
Peerless Motor Car Co. pfd.	..	62½	..	..	..
Portage Rubber Co. com.	..	40	35	38	..
Portage Rubber Co. pfd.	..	90	85	88	..
*Reo Motor Truck Co.	8¾	9¼	15	15½	+ ½
*Reo Motor Car Co.	26½	28½	32½	..	+1½
Splitdorf Electric Co. pfd.	40	50	..	..	..
Stewart-Warner Speed, Corp. com.	47	49	64	65	+4
Stewart-Warner Speed, Corp. pfd.	97	98½	102	105	..
Studebaker Corporation com.	32¾	34	65	67	+4

	1914		1915		Wk's
	Bid	Asked	Bid	Asked	Ch'ges
Studebaker Corporation pfd.	89½	190½	96	98	—1
Swinehart Tire & Rubber Co.	65	70	80	90	..
Texas Co.	140	141½	123	124	+2
U. S. Rubber Co. com.	58½	59	61	63	+1
U. S. Rubber Co. 1st pfd.	102¾	102¾	104¾	106¾	+ ¾
Vacuum Oil Co.	217	220	195	205	+1
White Co. pfd.	107	110	103	108	..
Willys-Overland Co. com.	69½	73	111	113	+2
Willys-Overland Co. pfd.	92	94	99½	102	—¾

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS				
Chalmers Motor Co. com.	101	..	89	92
Chalmers Motor Co. pfd.	92	..	94	97
Continental Motor Co. com.	150	180	..	185
Continental Motor Co. pfd.	..	75	84	85½
General Motors Co. com.	83	84½	137	139
General Motors Co. pfd.	93½	95	98	101
Maxwell Motor Co. com.	13¾	14½	40	42
Maxwell Motor Co. 1st pfd.	46	47½	83	84½
Maxwell Motor Co. 2d pfd.	20	21	35	36½
Packard Motor Car Co. com.	103	..	104	..
Packard Motor Car Co. pfd.	98½	100½	..	100½
*Reo Motor Car Co.	27½	28½	32¾	33¾
*Reo Motor Truck Co.	9¾	10¾	15	15¾
Studebaker Corporation com.	..	..	66	67½
Studebaker Corporation pfd.	..	..	..	99

INACTIVE STOCKS				
*Atlas Drop Forge Co.	..	21	..	26
Ford Motor Co. of Canada.	..	555	900	..
Kelsey Wheel Co.	..	193	200	..
*W. K. Prudden Co.	..	20½	19½	..
Regal Motor Car Co. pfd.	..	30	..	25

BONDS				
General Motors, notes, 6s, 1915.	101	102	..	..
Packard Motor Co., 5s, 1916.	95	98½	98½	..

*Par value \$10; all others \$100 par value
†Ex. dividend

Twin City Speedway Plans

Total Investment About \$603,000—Track to Be Cement—50,000 Spectators

MINNEAPOLIS, MINN., May 22—President F. H. Wheeler of the Twin City Speedway Co., who spent a few days in the city this week, is confident that by August 15 all of the work of constructing the 2-mile motor oval will be completed and ready for a race which it is hoped will be staged towards the end of September. Work was started 2 weeks ago and night gangs will soon be started.

The total investment will approximate \$603,000, made up as follows: Land, 343.5 acres, \$142,000; concrete track, \$181,000; grading of land for track and stands, \$80,000; covered steel grandstands to seat 50,000 spectators, \$100,000; four 60-foot tunnels under track, \$50,000; fence, \$10,000; garages and other buildings, \$40,000.

The track is to be a cement oval 80 feet wide at all points and with 500-foot straightaways on each side. The banking on the curves is for a speed of 120 miles per hour, this banking being as a paraboloid curve rather than a straight incline. On both sides of the track is a 2.5-foot cement wall extending all the way around. The grandstands are set 30 feet back from the track on the stretches and 40 feet back on the curves.

To Stage 200-Mile Event at Hamline

HAMLIN, MINN., May 22—Plans are made for a 200-mile automobile race at the Minnesota state fair at Hamline. The first leg, 100 miles, will be run September 8 and the second September 11. The purse will be \$5,000, divided as follows: First, \$2,500; second, \$1,000; third, \$500; fourth, \$300; fifth, \$100. Of the total \$600 is reserved for a consolation race, the first money being \$350; second, \$150; third, \$100. As the International Motor Contest Assn. limits starters to ten an elimination trial over a 2-mile course may be necessary. Cars failing to enter the big event may enter the consolation sweepstakes race of 25 miles. Entries for the race close August 10, entry \$100. To best the Hamline and world 1-mile and 5-mile circular dirt track records trials will be run the first day. Five hundred dollars is offered to break the world record and \$200 for the track record of 4:17.

Columbus May Build Speedway

COLUMBUS, O., May 21—Because of the large crowd which attended the race

meeting held in Columbus, May 15 and 16, when about 20,000 paid admission on one day, several Columbus men have started a movement to build a motor speedway similar to the one at Los Angeles. One plan discussed is to have the owners of the Columbus Driving Park build up the turns and make the track more suitable for automobile racing.

Spokane Holds First Show

SPOKANE, WASH., May 20—Spokane's first automobile show held the attention of the dealers and also thousands of interested spectators, who thronged the Davenport Hotel, which had been changed to a luxurious garage, and which made an ideal setting for the cars.

Although held late in the season the show was a success, the sales made being far beyond the expectation of the dealers. The Seven-Seven Co., agent for the Dodge, received deposits on fourteen cars the first day the show opened.

Another feature of the show week was the hill climbing contest. The course was 2,074 feet in length and the average grade 8.05 per cent., the maximum pitch being 17 1-2 per cent. In other words the cars were required to rise 168 feet in two-fifths of a mile with a running start of a little more than 100 yards.

A stripped Ford, driven by Harry Bell, made the best time going over the hill in 40 seconds flat, a speed of 36 miles an hour. It was the free-for-all race in which the Ford was victorious. A National car, driven by George H. Beck, was second, making the distance in 41 3-5 seconds and a Cadillac eight, third in 44 3-5 seconds.

Event No. 1—Stock cars costing less than \$1,000—Dodge first, 49 2-5 seconds; Buick, second, 54 2-5; Maxwell third, 55.

Event No. 2—Cars costing between \$1,000 and \$1,500—Buick, first, 50 2-5 seconds; Paige, second, 51 2-5; Chandler, third, 52 1-5.

Event No. 3—Cars costing more than \$1,500—Cadillac, first, 45 2-5 seconds; Cole, second, 49 3-5; Franklin, third, 55 2-5.

Twelve Tacoma Entries to Date

TACOMA, WASH., May 21—Entries for the Tacoma races, July 4 and 5, have received a boost during the past week, the latest to come in being the Maxwell team of three cars with Endicott and Carlson nominated as drivers, with Arthur Klein a possibility for the third car. Besides these Capt. Kennedy has been entered with the Edwards Special, and Jennings with the Keeton. This will give to the Tacoma races two cars which have never yet appeared here, as well as some new drivers.

The Edwards Special was built in California for the Vanderbilt and Grand Prix, while the Keeton is the car with

which Bob Burman made a record at the Tacoma races in 1913. The machine has been entirely rebuilt. The Tacoma entry list is as follows:

Car	Driver
Mercer	Pullen
Mercer	Ruckstell
Mercer	Thomas
Stutz	Earl Cooper
Stutz	Lewis
Maxwell	Carlson
Maxwell	Endicott
Maxwell	Unnamed
Peugeot	Burman
Parsons Special	Parsons
Keeton	Jennings
Edwards Special	Kennedy

Briggs-Detroit Builds Four-Cylinder Racing Car

DETROIT, MICH., May 22—The Briggs-Detroit Co., which makes the Detroit four and eight, will go into racing. A car is now in course of construction and is expected to be ready to take part in dirt track races in July. The racer is to have a special high powered four-cylinder motor, but the chassis is to be a regular stock Detroit. It has not yet been decided who will pilot the car.

Wager of \$1,000 on 315-Mile Endurance Run to Minneapolis

CROOKSTON, MINN., May 22—A race of 315 miles to Minneapolis is announced for June 5. Walter J. Hill, son of J. J. Hill, whose business address is Northcote, Minn., will race A. F. Harland, of Chicago, for \$1,000 against \$500. It will be an endurance run, replenishing of gasoline tanks and necessary repairs being allowed. Hill will drive a Packard and the Chicago man a Marmon.

Demand Sends Benzol Price Up

NEW YORK CITY, May 20—Increasing demands from the purchasing agents of the allies for benzol has resulted in further advances in prices of the product. Domestic inquiries for benzol and toluol have found few producers able to fill the orders, because the output of practically every available plant has been contracted for by the war agents for a long period ahead. Benzol is now being sold in bulk anywhere from \$1 to \$1.50 a gallon and is being used by the allies mostly for explosives.

The Lackawanna Steel Co., the Republic Iron & Steel Co., the Laclede Gas Light Co., of St. Louis, and the Woodward Iron Co., of Alabama, are among the companies which have completed large benzol plants within the last week, or are rushing new establishments to completion to meet the extraordinary demand.

Titus with N. Y. Hudson

NEW YORK CITY, May 25—E. S. Partidge, sales manager of the R. M. Owen Co., Hudson distributor in New York City, has added Fred J. Titus to the staff. Titus was recently with the Simplex company.

Jitneys Regulated in New York

Thompson Bill Signed—Developments in Other Parts of the Country

ALBANY, N. Y., May 22—New York State's first law regulating jitney buses became operative today, when Governor Whitman signed the Thompson bill placing them under the jurisdiction of public service commissions and municipal authorities.

At a recent hearing on the measure jitney owners told the Governor his approval of the bill would drive them out of business, as it was worded so that it would require each one to file a \$5,000 bond. The Governor then announced that if he found this assertion well grounded he would veto the measure.

In a statement accompanying his approval today the Governor did not comment on the bond question.

New Ruling on Jitney in Wash.

OLYMPIA, WASH., May 16—In an opinion by assistant attorney general E. W. Allen it is ruled that a stage operating between a first class city and some outside point, even though passengers are not carried between points within the first class city, is a jitney bus so far as the 1915 law is concerned, and must therefore post the statutory \$2,500 surety bond.

It is also held that a jitney must post the bond, whether it follows a regular route and runs under regular time or not, and that a personal surety bond is not sufficient. The surety bond must be guaranteed by a company licensed to do business in the state.

Jitneys Exempt from Pennsylvania State Control

HARRISBURG, PA., May 20—Jitney buses do not come under the provisions of the law creating the Public Service Commission, and certificates of public convenience are not necessary, according to the general opinion expressed at the commission headquarters recently.

Jitney Union in Minneapolis

MINNEAPOLIS, MINN., May 24—Fifty jitney bus drivers in Minneapolis have formed the Jitney Bus Men's Union. Opposition to unfriendly legislation was the motive. The union condemned overcrowding of the machines and careless driving. Transfer of passengers was opposed, also a proposed \$10,000 liability bond. Purchase of accessories in Minneapolis was pledged and a uniform sign was agreed upon. Taxicab rates will be charged only off the regular routes for

any car. Officers were elected as follows: President, J. C. Wallace; vice-president, F. C. Strasburg; secretary-treasurer, H. Belitz; recording secretary, A. E. Higby; executive committee, W. A. Johnson, C. E. Lind, F. H. Anderson. Membership has already reached seventy-five.

Washington Recognizes Jitneys

WASHINGTON, D. C., May 22—An important report on the jitney bus has been made to the public utilities commission by Conrad Syme, corporation counsel of this city, who recently made an extensive trip around the country investigating the jitney bus situation. That the jitney bus has become an important factor in modern city transportation, that the people of Washington have a right to this form of transportation and that "any further extension of street railway tracks in or near the business section of the city may be very unwise," are the three principal conclusions reached by Syme in his report. The report is based on a study made by Syme of conditions in New Orleans, Los Angeles, San Francisco, Kansas City and St. Louis.

Other of Syme's conclusions are that the jitneys strike directly at the short-haul revenues of the street railways, that, though the cars have caused considerable congestion in the streets, this has brought about little trouble and that the jitney systems are dependent on a minimum of restrictions in order that they may be run profitably.

Providence Jitney Ordinance Passed

PROVIDENCE, R. I., May 20—The Common Council on May 17 passed the jitney ordinance adopted by the Board of Aldermen. The main features of the ordinance are: a license fee of \$5 per passenger seat; bond of \$500 per passenger seat; drivers must be 20 and pass road test; jitneys may wait 5 minutes downtown for passenger; passengers limited to seating capacity of machine; no smoking or drinking by drivers; no advertising on outside of machine; and takes effect July 6, if approved by mayor.

Pacific Coast Jitneers Discouraged

TACOMA, WASH., May 20—A review of the jitney situation on the Pacific Coast shows that there was an average of 290 machines in operation in Portland, Ore., during April, while in March there were 320 in operation. Of this number 275 are members of the Auto Transit Welfare Assn. The jitney people are becoming discouraged. Owing to the financial condition of most of the owners it will be with difficulty that they will be able to wage a campaign to defeat the referendum ordinance regulating them.

In Seattle the courts have upheld the

validity of the jitney state law which requires that jitney drivers are to operate under a license and a personal bond of \$100 a year.

In San Francisco members of the street car men's union who have been discharged by the United Railroad, propose to get into the jitney business and compete with their former employers. About 100 of these men propose to operate jitneys.

Virginia Railroad Earnings Hit by Jitneys

RICHMOND, VA., May 20—In its report of earnings for April, 1915, the Virginia Railway & Power Co. shows clearly the effect of the jitney competition in Richmond on its revenues. Gross for April was \$9,638, or 2.29 per cent. below April, 1914.

Previous to the advent of the jitneys in Richmond, the gross of the company was showing a good gain over the preceding year, but it did not take long for the jitneys to turn this increase into a decrease. In April, 1915, operating expenses increased \$8,148, or 4.22 per cent.

Lose in Oakland, Cal.

OAKLAND, CAL., May 20—That the people of the Pacific coast have decided that the jitneys require regulation is indicated by the adoption by over 9,000 majority at the special election in Oakland of an ordinance imposing heavy restrictions on jitney operation. At the same time an ordinance changing the annual license fee for jitneys from \$60 to \$10 was defeated.

\$25 a Year in New Albany, Ind.

NEW ALBANY, IND., May 21—The city council of this city has adopted an ordinance aimed to regulate the jitney bus business by imposing a license fee of \$25 a year on motor-driven vehicles used for transportation of passengers for hire and prohibiting them from standing in front of stations. It is asserted that the receipts of the traction company show a falling off of nearly 50 per cent. in the last 2 months.

Railroad Engineers Run Buses

RUTLAND, VT., May 22—Starting today a cross-state line using steam automobiles driven by railroad engineers began operations between this city and Stockbridge in Eastern Vermont. It is not competing with the railroad, for it makes a connection between the White River Road and the Rutland. Vice-president E. S. French of the former railroad is at the head of it. By using the motor road it means a saving of \$2.05 in fares and a couple of hours between Rutland and Randolph, and it provides an easy way to reach Montpelier, the capital, by changing at Bethel. Busses carrying 15

are used, and one round trip a day is made at present. The service will be increased later. It is not a jitney line, for the fare is \$1.50. Trucks will be used to carry freight and baggage if conditions warrant it later.

Must Carry Rear Sign

PHILADELPHIA, PA., May 22—To lessen the risk of accidents an order has been issued requiring jitneys to have a placard or metal sign bearing the words Jitney Bus on the rear of the machines as well as on the front.

An order was also issued prohibiting automobiles using dealers' license tags for the jitney traffic.

Baltimore to Washington

BALTIMORE, MD., May 21—The motorbus service between Baltimore and Washington started recently and the new line bids to be very successful. The buses leave the Hotel Emerson in this city at 8 and 11 a. m. and 2 and 5 p. m.

Baltimore is now connected with Taneytown by a motorbus line started today.

Must Have License in Indianapolis

INDIANAPOLIS, IND., May 21—Mayor Joseph E. Bell has declared war on unlicensed jitney buses in Indianapolis. He wrote a letter to Samuel V. Perrott, chief of police, directing that officers be assigned to patrol the streets of the business district to ascertain if all the buses have city licenses and to arrest the drivers of all machines not having such licenses.

Jitneys Numerous in Wilmington

WILMINGTON, DEL., May 24—Jitneys have become so numerous in Wilmington that the city authorities have taken under consideration the matter of regulating their use of the streets. The matter was a subject of a conference a few days ago between city council and the street and sewer department, which has control of the streets, and at the last meeting of the latter department it was announced that some action would be taken as soon as it was determined what ought to be done. The jitneys have been curtailing the trolley revenue, but this is not the reason for their proposed regulation.

159 Violations of Pennsylvania Law

HARRISBURG, PA., May 22—A statement of the fines collected for violation of the automobile law in 1914 shows 159 violations in the several counties of the state with total fines collected amounting to \$19,853.89. Of this amount \$16,242.48 was paid to city, borough or township treasurer, \$3,611.41.

The violations and fines collected for each were as follows: Operating when

intoxicated, \$731; operating without registration, \$290; operating without consent of owner, \$64.41; failure to sound horn, \$1,067; failure to stop when signalled, \$30; passing car discharging passengers, \$702; failure to display badge, tag or lights, \$727; violation of speed limit, \$16,242.48.

Cook Kelly-Springfield Tire Director

NEW YORK CITY, May 20—At a special meeting of the board of directors of the Kelly-Springfield Tire Co., O. R. Cook, Cleveland, O., was elected a director.

Ford Gives 20 Acres for Athletic Field

DETROIT, MICH., May 21—One-third of a 60-acre tract of land belonging to Henry Ford and located to the north of the Ford Motor Co.'s plant, has been donated by Mr. Ford to the employees of the company and also to the people of Highland Park, upon whose territory it is located.

The ground is to be used as an athletic field and will have four baseball diamonds, a dozen tennis courts and other playgrounds, also dressing rooms and shelter stations. Eventually more of the land may be fitted up for the same purpose. At the present time Chief Construction Engineer R. Brown, of the Ford company, has all plans ready for starting a force of men to fix up the field.

The land was bought by Mr. Ford several years ago and is estimated to be worth now over \$500,000.

Bad Bills in Illinois

CHICAGO, ILL., May 24—There are three distinct measures now before the state legislature at Springfield, all of which will be detrimental to the interests of the automobilists of the state if they are enacted as laws. The most serious of the three measures is a bill which will exactly double the present license fees. That is instead of paying the present fee of \$6 for a car of 25 to 35 horsepower, the registration annually will cost \$12. Fees for other sizes of cars are raised in proportion, except for those over 50 horsepower, in which case the registration is increased from \$10 to \$25.

The present law governing the speed of a motor vehicle in this state sets the lower limits at which cities and towns may establish speed limit by ordinance. There is a bill now before the legislature which provides that any city, village or incorporated town may make such legislation as to the speed of motor vehicles as it deems proper, but in no case authorizing a higher speed than provided in the bill. That is, the towns can make the legal limit as low as they please, which would result in wholesale arrests and

gross abuse. Another bill would make it necessary for motorists to stop within 50 feet of any unprotected railroad crossing.

150,000 Cars for Iowa in 1915

DES MOINES, IA., May 21—Iowa already has registered over 100,000 automobiles for 1915 and the state automobile department states that the number will go above 150,000 before the end of the year. The registration is already 20,000 ahead of what it was at the corresponding date last year. The number of machines registered in 1914 did not pass the 100,000 mark until late in August. About two-fifths of the machines now being registered are new cars. Applications for registration are pouring in at the rate of 1,000 a day and the state department is two weeks behind in shipment of plates. The new registration law which goes into effect July 4 and which provides that plates shall be good for 3 years does not affect plates and registrations for the current year.

Nebraska to Use Convicts on Roads

LINCOLN, NEB., May 21—Among the important laws that were passed by the recent Nebraska legislature and of keen interest to the automobilists of this state, were two road laws which will go into effect in July. One has to do with the use of convicts on roads, and the other creates a new state advisory highway board.

The first provides that the county commissioners shall make a requisition on the board of control for as many convicts as are wanted for the work on the highways. The board of control is given authority to arrange the financial part of it.

The law for the advisory highway board provides for the appointment of this board of three by the state board of irrigation, highways and drainage, to assist the latter board in an advisory capacity in the taking up with the county boards the building of roads, culverts and bridges, or when the county board so requests, to assist in the preparation of plans and in the supervision of the work of construction or repair and maintenance of any public highways in the state.

More Cars in Missouri

JEFFERSON CITY, MO., May 20—Statistics covering the months of February, March and April of this year show that 2,388 more automobiles were registered in Missouri in these three months than during the entire year of 1914. The money received by the state for automobile licenses during these three months totalled \$239,293 against \$245,873.50 for the entire registration year ending January 31, 1915.

Factory Miscellany

Whitney to Enlarge—The Whitney Mfg. Co., Hartford, Conn., has planned for immediate work on an addition to its plant.

Truck Plant for Altoona, Pa.—The Monarch Machine Co., Altoona, will build a plant for the manufacture of motor trucks.

West Bend Co. Adds Equipment.—The West Bend Plating Co., West Bend, Wis., is installing considerable new equipment, including four 100-gallon vats, enabling it to handle larger plating jobs, including radiators and motor car accessories of large size.

Cleveland Gauge Acquires Machinery.—The Reliance Gauge Column Co., Cleveland, O., has taken over the Cleveland Clutch Co., and the machinery of the latter will be removed from its plant at Urbana, O., to the new Reliance factory, 5902 Carnegie avenue, completed in January.

New Falls Rubber Plant.—Plans have been prepared for a new factory for the Falls Rubber Co., Cuyahoga Falls, O. The building will be 80 by 40 feet, three stories high, of brick and steel construction. Bids for the construction will be invited in the near future. It is planned to erect a power plant later.

Wayne Increases Working Hours.—The Wayne Oil Tank & Pump Works, Fort Wayne, has increased its factory

hours from 60 to 72 a week and is hiring a great many more men. The firm is doing much more business than ever before. Under its present schedule 4 days in the week all departments work from 7 o'clock in the morning until 9 o'clock in the evening.

Kissel Gets Repeat Ambulance Order.—The Kissel Motor Car Co., Hartford, Wis., has booked a repeat order for ambulance trucks from the government of Servia. The deal was closed in New York City by President G. A. Kissel and calls for thirty ambulances. The Kissel company shipped a number of trucks to Servia last fall. The Hartford shops have reached the greatest capacity ever attained and are employing nearly 1,000 people.

Overland Plans Body Plant for Indianapolis.—The building formerly occupied by the Willys-Overland Co., Toledo, O., at 15th street and the Big Four Railroad, Indianapolis, Ind., will be converted into a plant for special automobile body construction work, according to plans outlined by J. N. Willys, president of the company. Modern machinery will be installed and employment will be given to approximately 500 men.

Sommer Plant to Be Enlarged.—The Sommer Motor Co., Bucyrus, O., will build a \$10,000 addition, which will more than double its output of motors. The buildings will be of brick construction

and will contain approximately 7,500 feet of floor space. Plans for the buildings have already been made, and the company expects to occupy the new structure before September 1. Clutches and transmissions have been added to the product of the factory and preparations are being made to turn out the motors, clutches and transmissions for at least 4,000 cars for 1916.

Mogul Truck to Build.—The Mogul Truck Co., now at 6100 Maple avenue, St. Louis, Mo., has purchased a tract 125 by 187 feet on Forest Park Boulevard, where the erection of a new factory for the company will begin as soon as the architect's plans are completed. Besides manufacturing quarters, the new building will contain a storeroom for truck parts and accessories, a showroom for the display of finished trucks, machine shops and the general offices of the company. The size and cost of the building have not yet been determined. Grading of the lot already has been started.

The site of the new factory is the center of renewed building activities. The Linde Air Products Co. of New York is erecting a \$100,000 building directly across the street from the Mogul company's site and the Ford Motor Car Co. a half block away will add a large unit to its assembling plant there this summer.

The Automobile Calendar

May 27.....Chicago, Ill., Sociability Run of Chicago Motor Club to South Bend, Ind., H. H. Robinson.
May 29.....Indianapolis, Ind., 500-Mile Race, Indianapolis Motor Speedway.
May 29.....Philadelphia, Pa., Stone Harbor Memorial Day Run from Philadelphia.
May 29-30.....Seattle, Wash., Track Races; Northwest Automobile Assn.
May 31.....Newark, N. J., Track Race, Olympic Park, Matty Matthews Auto. Racing Assn.
May 31.....York, Pa., Track Race, York Fair Grounds, York Motor Club.
June 3.....New York City, 11th Annual Automobile Outing for Orphans; Orphans' Auto. Day Assn. of N. Y.
June 3.....New York City, N. A. C. C. Annual Meeting.
June 7-11.....San Francisco, Cal., National Electric Light Assn.
June 9.....Galesburg, Ill., 100-Mile Race, Galesburg District Fair Assn.
June 11-12.....Effingham, Ill., Hillclimb and Fuel Economy Test, Salt Creek Hill, Effingham Automobile Club.

June 12.....Brighton Beach, Track Race; E. A. Moross.
June 14-17.....Detroit, Mich., Summer Meeting of the Society of Automobile Engineers and Start of Cruise to Georgian Bay.
June 15-17.....Chambersburg, Pa., Run to Atlantic City.
June 19.....Chicago, Ill., 500-Mile Race, Chicago Speedway.
July 3.....Sioux City, Ia., 300-Mile Race, Sioux City Speedway Assn.
July 4.....Visalia, Cal., Road Race; Tulare County Automobile Assn.
July 4-5.....Tacoma, Wash., Road Race, Tacoma Speedway Assn.
July 5.....Omaha, Neb., Speedway Races, Omaha Motor Speedway.
July 5.....Visalia, Cal., Road Race, Tulare Co. Auto. Assn.
Aug.....Milwaukee, Wis., Independent Petroleum Marketers' Assn. of the U. S.; 1915 Convention in Milwaukee.
Aug. 2-3.....San Francisco, Cal., Tri-State Good Roads Assn., Third Annual Convention.
Aug. 20-21.....Elgin, Ill., Road Races.
Sept.....Indianapolis, Ind., Fall Show, Indiana State Fair.
Sept.....Peoria, Ill., Second Northwestern Road Congress.

Sept. 6.....Providence, R. I., Speedway Race; F. E. Perkins.
Sept. 6.....Detroit, Mich., Speedway Race; Detroit Speedway Club.
Sept. 8-11.....Hamline, Minn., 2-Day Meet at State Fair Grounds between Minneapolis and St. Paul, State Fair.
Sept. 13.....Oakland, Cal., Pan American Road Congress.
Sept. 17-18.....Peoria, Ill., Illinois Garage Owners' Assn. Convention.
Sept. 20-25.....San Francisco, Cal., International Engineering Congress.
Oct.....St. Louis, Mo., Show, Forest Park Highlands, St. Louis Automobile Manufacturers and Dealers' Assn.
Oct. 1.....Minneapolis, Minn., Track Race, Twin City Motor Speedway Co.
Oct. 1-2.....Trenton, N. J., Track Races; Inter-State Fair.
Oct. 2.....New York City, Sheepshead Bay Motor Speedway Track Meet.
Oct. 6-16.....New York City, Ninth Electrical Exposition and Motor Show at Grand Central Palace.
Dec. 31.....New York City, Show; Grand Central Palace.
Jan. 22, 1916.....Chicago, Ill., Show; Coliseum.

The Week in the Industry



Bell Columbus McNaull Mgr.—The McNaull Tire Co. has opened a branch in Columbus, O., located at 81 South Fourth street. B. K. Bell is manager, with F. L. Beebe sales manager.

Wallace Portland Metz Mgr.—W. D. Wallace, one of the best known automobile men on the Coast, has been named as sales manager of the Oregon Metz agency, with headquarters in Portland.

Morris Moon's N. W. Sales Mgr.—J. C. C. Morris is the new Northwestern sales manager of the Moon Motor Car Co. and makes his headquarters in Seattle, Wash. He has jurisdiction over all sales in Idaho, Oregon, Washington and Nevada.

Hull Retires.—F. L. Hull has retired from the Junction Garage Co., Milton Junction, Wis., and the business will be continued by R. Leon Burdick and Herman Harte, the other partners. The garage has just moved into new and permanent quarters.

Brick Succeeds Lane.—W. J. Brick, formerly of the Campbell & Brick Heating Co., Winnipeg, Man., has taken over the management of the Canadian Motor Co., succeeding A. T. Lane, who previously held the post. Mr. Brick has been a director of the company for some time.

Dealer

Polack Tire in Cincinnati.—The Polack Tire and Rubber Co. has established a branch office in Cincinnati, O., in the Union Central Bldg. A completely equipped service station was also established. The company's business is in charge of J. M. Briceland.

Midgely Tire in Baltimore.—The Tire Service Co., Baltimore, Md., will have the exclusive handling of the Midgely tire for Baltimore and the state. It is located at 204 St. Paul street, and A. P. Mosby, formerly of the Knight tire agency of this city, heads the new concern.

Case Erects New Addition.—The J. I. Case T. M. Co., Racine, Wis., has started construction work on its new branch house and garage at Madison, Wis. The building will be fireproof, 100 by 140 feet, two stories high, with a basement 100 by 184 feet, to be devoted to the automobile business exclusively. It will cost about \$50,000. C. C. Doring is manager.

Motor Men in New Roles

Rafter Milwaukee Winton Mgr.—W. A. Rafter has been appointed manager of the Milwaukee branch of the Winton Motor Car Co., Cleveland, O.

Gall Goes to Denver.—F. J. Gall, formerly sales representative for the Mayo Mfg. Co., Chicago, Ill., resigned to accept a position as sales manager for the Colorado Motor Co., Denver.

Cowan Appointed Mgr.—E. E. Cowan, formerly with G. W. Shroyer & Co., Dayton, O., has been appointed general manager of the Guarantee Tire and Rubber Co., an accessory and tire concern of Indianapolis.

Boyer Heads Detroit Springfield Body.—The Springfield Metal Body Co., Springfield, Mass., has opened offices in the Whitney Bldg., Detroit, under the management of Joseph Boyer, Jr.

Huff Joins Simms.—E. S. Huff, formerly connected with the Maxwell Motor Co., Detroit, Mich., has joined the Simms Magneto Co., East Orange, N. J., and will work on the development of the starting and lighting systems.

Krause Joins Champion.—G. A. Krause, formerly connected with the engineering department of Jeffery-De Witt Co., has resigned and will take a position with the Champion Spark Plug Co., of Toledo, as traveling service representative.

Perlitz Joins Bromfield & Field.—A. O. Perlitz has become identified with Bromfield & Field, Inc., advertisers, in New York City. Mr. Perlitz was formerly with the Electric Vehicle Co. and the Locomobile Co. of America in Chicago and Minneapolis.

Fassnacht Makes Change.—G. A. Fassnacht, formerly branch manager of the B. F. Goodrich Co. in Toronto and Omaha, has taken charge as manager of the Sixth City Tire Repair Co., a new incorporation of Cleveland, O. It is located at 1737 Euclid avenue.

Eib Makes Change.—C. C. Eib, for years assistant manager of the Pioneer Motor Car Co., San Francisco, Cal., and later holding a like position with the Oakland Motor Car Co., has joined the J. W. Leavitt Co., Overland distributor. He will act as executive supervisor.

Gutelius Stull Starter Distributor.—Nelson T. Gutelius, formerly advertising manager of the Motor Car Equipment Co., New York City, has resigned to take a position as metropolitan distrib-

utor of the Stull mechanical starter for Ford cars. Sales offices have been opened at 103 West 16th street, New York City.

Haggerty and Earle Transferred.—W. E. Earle, who has been manager of the Indianapolis sales branch of the Ajax-Grieb Rubber Co., has been transferred to a traveling position in the New England territory. C. J. Haggerty, who has been with the company at Brooklyn, N. Y., has become manager of the Indianapolis branch.

Sweeney Maxwell Publicity Mgr.—C. F. Sweeney, of York, Pa., for 3 years advertising manager and later sales manager for the Kline Motor Car Corp., Richmond, Va., has been appointed a publicity manager for the Maxwell Motor Co., Detroit, Mich. Mr. Sweeney for a number of years has been engaged in newspaper work, having just resigned the position as managing editor of the *Star and Sentinel*, Gettysburg.

Read Heads Puritan Engineering Dept.—S. R. Read has assumed charge of the engineering department and machine shop of The Puritan Machine Co., Detroit. The company tendered a banquet to its department heads May 19, at the Hotel Griswold, Detroit. Those present included H. G. Gremel, O. R. Taylor, F. M. Eldredge, E. W. Hawley, C. H. Albright, W. J. Ripley, S. R. Read, O. C. Flatter, A. Courrier, W. Cavan, A. Shoup, M. Gaucher and Misses V. M. Klie and E. L. Melick.

Garage

Electric Garage for Baltimore.—June 1 will mark the opening of a new electric garage in Baltimore, Md. It will be run by A. W. Beam, Jr., Baltimore distributor of the Detroit Electric and will be located on Cathedral street near Chase street. At the same time the name of the present concern—the Detroit Electric Car Co.—will be changed to the Beam Motor Car Co.

New Automobile Bldg. for Queens.—One of the largest additions to the automobile center in Queens, N. Y., has been planned by the Everett Realty and Construction Co., which has filed plans for a twelve-story building to be erected on a 23,000 square-foot plot at Jackson avenue and 10th street. A large automobile elevator, 10 feet wide and 21 feet long, accessible from 10th street, will enable trucks to drive up to and on their respective floors.